



**SCOPING REPORT AND TERMS OF REFERENCE:**

**Environmental and Social Impact Assessment Study of Surgold’s Merian Project in Suriname**

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**Environmental Resources Management**  
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## *LIST OF ACRONYMS AND ABBREVIATIONS*

ARD	Acid Rock Drainage
ATM	Ministry of Labor, Technological Development and Environment
BBS	National Herbarium of Suriname
CCD	Counter Current Decantation
CITES	Convention on the International Trade of Endangered Species of Wild Fauna and Flora
CIL	Carbon-in-Leach
CSNR	Central Suriname Nature Reserve
DS	Desktop Study
EA	Environmental Assessment
EC	Electric conductivity
EHS	Environmental Health Statement
ERM	Environmental Resources Management, Inc.
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESS	Environmental Specialist Study
FIV	Family Importance Value
GoS	Government of Suriname
ha	hectares
HIA	Human Health Impact Assessment
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature and Natural Resources
JV	Joint Venture
km	Kilometers
km <sup>2</sup>	Square kilometers
LBB	Dienst's LandsBosbeheer (Forest Service)
LVV	Ministerie van Landbouw, Veeteelt en Visserij (Ministry of Agriculture, Animal Husbandry and Fisheries)
m	Meters
masl	Meters above sea level
MNH	Ministerie van Natuurlijke Hulpbronnen (Ministry of Natural Resources)
Moz	Million ounces
Mtpa	Million tonnes per annum
MRD	Ministry of Regional Development
MW	Megawatts

NAAQS	National Ambient Air Quality Standard
NCD	Nature Conservation Division
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organization
NIMOS	National Institute for Environment and Development in Suriname
NMR	National Council for the Environment
NTFPs	Non-Timber Forest Products
PA	Participatory Appraisal
PRA	Participatory Rural Appraisal
PCDP	Public Consultation and Disclosure Plan
RAP	Rapid Assessment Program
RGB	Ministry of Spatial Planning, Land and Forestry Management
PRA	Participatory Rural Appraisal
RBA	Rapid Biological Assessment
RRE	Restricted Range Endemic
SBB	Suriname Forest Control Foundation
SCF	Suriname Conservation Foundation
SES	Socio-economic Specialist Study
SIA	Social Impact Assessment
STIs	Sexually Transmitted Infections
STINASU	Stichting Natuurbehoud Suriname (Foundation for Nature Conservation in Suriname)
ToR	Scoping and Terms of Reference
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCC	United Nations Framework Convention on Climate Change
WAD	Weak Acid Dissociation

## 1.0 INTRODUCTION

### 1.1 BACKGROUND

Suriname Gold Company, LLC (Surgold) is a limited liability company held by Newmont Overseas Exploration Limited and Alcoa World Alumina, LLC. Newmont is the manager of Surgold and Surgold holds the Merian Right of Exploration where the Project is located.

Surgold began exploration at Merian in 2004 and in 2007 applied for a right of exploitation. The company is about to start negotiations with the State to complete the Mineral Agreement that will set the conditions for the granting of the right of exploitation.

In accordance with the directives of the National Institute of Environment and Development (NIMOS) Surgold is required to prepare an Environmental and Social Impact Assessment (ESIA)<sup>i</sup> for which Surgold has commissioned Environmental Resources Management (ERM), an independent international environmental consultancy. This study will seek to identify, reduce or avoid negative impacts and promote positive impacts to the local communities and environment.

The Merian Gold Project is located in the northeastern part of Suriname, approximately 66km south of Moengo. The proposed mine site will comprise three, possibly four, open pits, a processing plant, waste rock management facility and tailings management facility, fuel tank farm, power generation, water treatment facilities, maintenance facilities and offices and worker accommodations. Total yield of the project is estimated at 3.5 million ounces (Moz) of gold. Most construction materials and operational supplies (e.g., construction vehicles and reagents) will be imported via the Nieuwe Haven port in Paramaribo. Detailed Project description including the mine site, processing plant, port and transport corridor, as well as site mineralogy and geology are provided in Section 2.0.

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<sup>i</sup> The “social” component of the ESIA addresses both social and health impacts of the Project

## 1.2

### **PURPOSE**

The purpose of this Scoping Report and Terms of Reference (ToR) is to set the objectives, define the scope, and establish the strategy and schedule to develop, review, and approve an ESIA for the construction and operation of Merian Project, as described above, at the Merian gold deposit in eastern Suriname. Surgold, as the proponent, is responsible for the preparation of the ESIA.

The ESIA is needed to evaluate the environmental and socioeconomic impacts of project-related activities during the construction and operation of the Merian Project. Surgold, using the consulting firm ERM, will prepare the ESIA to assess the environmental and socioeconomic impacts of the projects.

The following are the main objectives of the ToR document:

- To identify key issues and concerns raised by stakeholders for consideration in the development of the ESIA study; and
- To identify resource areas that have the potential to be impacted and environmental issues that may require further studies in the ESIA.

More detailed technical descriptions of the specific baseline studies are included in a separate document.

## 1.3

### **ESIA STUDY TEAM**

The ESIA team is composed of a staff with extensive mining, natural resources assessment, and international ESIA experience combined with several well-qualified international and local experts in terrestrial and aquatic ecology, social issues, and geotechnical engineering. Table 1-1 identifies the key team members as well as the local environmental, social, and engineering experts. Curriculum vitas for these staff are attached in Appendix A.

**Table 1-1 ESIA Core Team**

Name	Company	Role and Specialty Study	Years of Experience	Education
<b>PROJECT MANAGEMENT TEAM</b>				
David Blaha	ERM	Project Director	30 years	M.S. Environmental Management
Sunrita Sarkar	ERM	Project Manager	12 years	MA Sociology and History;
<b>TECHNICAL ADVISOR</b>				
Al Trippel	ERM	Mining Processes, Mine Closure and Reclamation,	> 25 years	M.S. Geology

Name	Company	Role and Specialty Study	Years of Experience	Education
		International Cyanide Code, DS1 and 2		
<b>SOCIAL/HEALTH/CULTURAL SERVICES</b>				
Alistair Gow-Smith	ERM	Social Assessment, SES 1	< 5 years	MS., Environmental Impact Assessment and Management
Salomon Emanuels	Equalance Foundation, Suriname	Social Assessment, SES 1	30 years	MSc., Cultural and Social Anthropology
Matthew Kuniholm	ERM	Social Assessment, SES 1	< 5 years	B.A., (1) Biology, (2) International Relations
Sinang Lee	ERM	Health Impact Assessment, SES 2	8 years	MPH, Environmental and Occupational Health Sciences
Emlen Myers	ERM	Archaeological and Historical Heritage, SES 3	30 years	PhD., Anthropology
Maggie Cawley	ERM	GIS, SES 1	7 years	MS., Urban and Regional Planning
Ben Sussman	ERM	Traffic assessments, Land Use, and Visual resources; SES1 and DS 5	10 years	M.S. City and Regional Planning
Dorothy Trippel	ERM	Social Assessment, SES 1	5 years	B.A., Anthropology, Sociology and Religious Studies
<b>PHYSICAL SERVICES/ENGINEERING</b>				
Yinka Afon	ERM	Air quality and climate, carbon footprint, odors, noise, vibration, and natural hazards; ESS 3 and 4, and DS 3, 4, and 6	8 years	M.S.E Environmental Process Engineering
Emma McKennirey	ERM	Water Resources and Waste Management; ESS 1 and 2	8 years	BSc., Civil Engineering, Water Resources Specialization
Paul Whincup	ERM	Geology, water supply, and water management; DS 1 and 2, and ESS 1 and 2	40 years	BSc., Geology
Andres Meglioli	ERM	Geology and Mine Reclamation and Closure; DS 1 and 2.	25 years	PhD., Geology; MBA Global Management
Gabe Luna	ERM	Geology and water resources; ESS 2 and DS 1	6 years	BSc., Environmental Geoscience
James Nalven	ERM	Hydrogeology and water management; ESS 2, DS 1 and 2.	> 30 years	MSc., Applied Geology
George Krallis	ERM	Surface and groundwater modeling; ESS 1, and 2	20 years	PhD., Civil Engineering
Romina Aramburu	ERM	Environmental management and monitoring plans and	8 years	BSc., Environmental Engineering

Name	Company	Role and Specialty Study	Years of Experience	Education
		due diligence		
<b>BIOLOGICAL SERVICES/BIODIVERSITY</b>				
Jason Willey	ERM	Aquatic Ecology; ESS 9	11 years	MS., Environmental Science and Policy
Sarah Piper	ERM	Aerial fauna studies, biodiversity, soils: ESS 6 and 7	9 years	B.A., Biological Sciences
Rutger De Wolf	Environmental Services & Support, Suriname	Forestry and Vegetation; ESS 5	5 years	M.S., Forestry
Bart De Dijn	Environmental Services & Support, Suriname	Wildlife and Vegetation; ESS 5 and 8	> 20 years	PhD., Zoology
Jan Mol	Zoology and biodiversity (Consultant - Anton de Kom University of Suriname)	Zoology and biodiversity; ESS 9	> 25 years	PhD., Biology
Paul Ouboter	Zoology and biodiversity (Consultant - University of Suriname)	Zoology and biodiversity; ESS 5 and 8	> 30 years	PhD., Biology

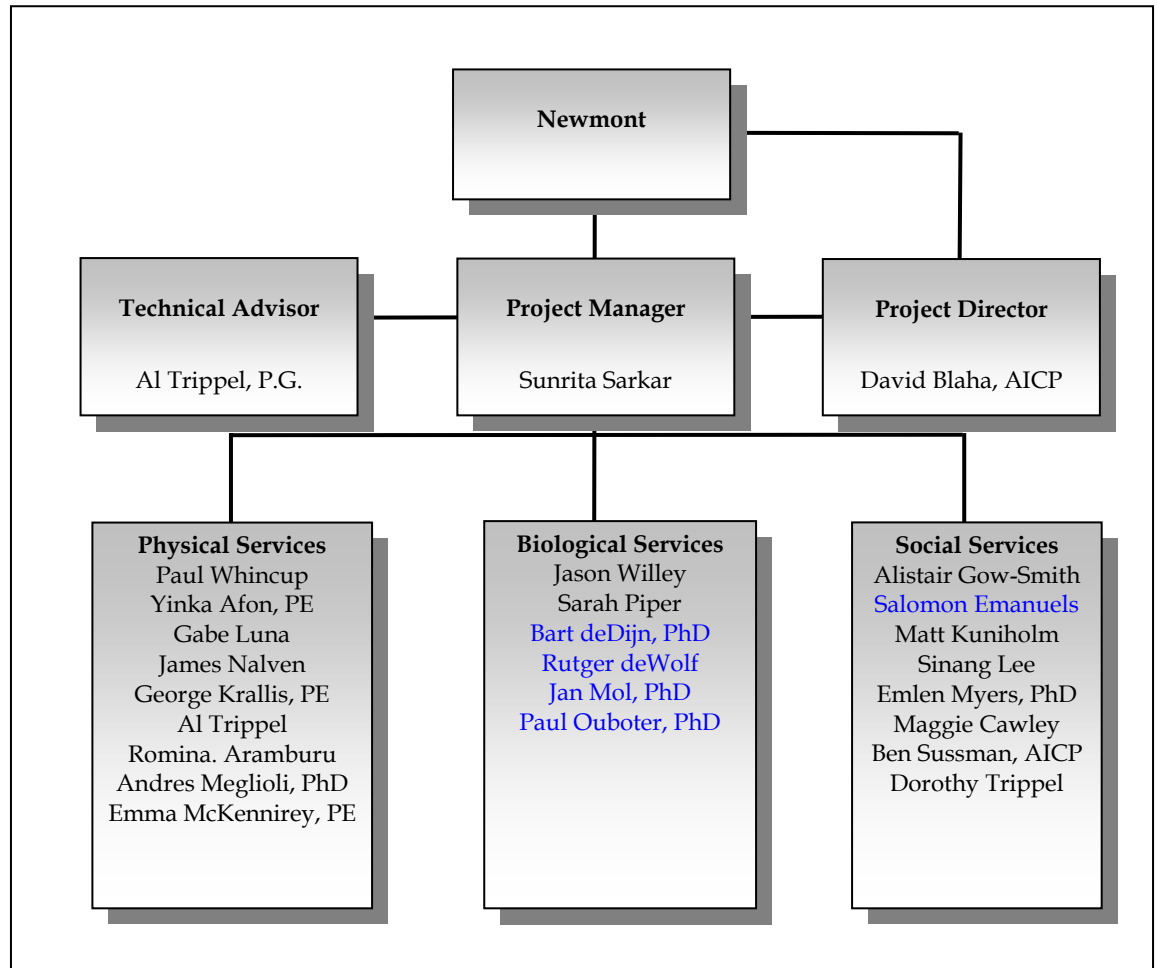
Key:

ESS = Environmental Specialty Study; SES = Socio-economic Specialty Study; DS = Desktop Study

<sup>a</sup> Indicates participation/ responsible for a particular Specialty Study; see Section 7.1

The core ESIA team is presented in Figure 1. The Project Manager and Project Director will conduct overall coordination for the studies. Each field study has a qualified expert as leader. Local Surinamese consultants are an important part of the study teams and will provide the local knowledge required. These local experts are well known in their fields in Suriname and are also recommended by NIMOS as subject matter experts.

Figure 1-1. Merian ESIA Project Team<sup>ii</sup>



Source: ERM

ii

ERM Staff-Highlighted in **black**

Sub contractors-Highlighted in **Blue**



## **2.0 PROJECT DESCRIPTION**

### **2.1 PROJECT LOCATION**

The Merian Gold Project is located in the northeastern part of Suriname, approximately 66 kilometers (km) south of Moengo and is accessed by the Moengo-Langatabiki road (Figure 2-1). The project site is located at the divide between the Marowijne and the Commewijne watersheds). The Marowijne River forms the border between Suriname and French Guiana whereas the Commewijne watershed is contained within Suriname. The nearest permanent population occurs on Langa Tabiki island and numbers approximately 500 people. This settlement is roughly 35 km by road from the Project. It is estimated that the project construction period will be 20 months and the current expected life of the mine is 11 years. Total yield of the project is estimated at 3.5 million ounces (Moz) of gold.

### **2.2 PORT AND TRANSPORTATION CORRIDOR**

Most construction materials and operational supplies (e.g., construction vehicles and reagents) will be imported via the Nieuwe Haven port in Paramaribo. This port facility will be upgraded as needed to support project demands. From the port, these materials/reagents will be trucked from Paramaribo on the East-West Highway to Moengo and then along the Langatabiki road to the site as shown in 2-1. The road from Paramaribo to Moengo is currently being upgraded by the Government of Suriname while the road from Moengo to the project site will be upgraded by Surgold. A new 16 km spur road will be built from the Moengo-Lagatabiki road to connect the Merian Project site.

Figure 2-1. Merian Project Location and Transportation Corridor



Source: ERM

### 2.3 SITE GEOLOGY AND MINERALOGY

The bedrock geology of the area comprises folded and faulted, inter-bedded graywackes, mudstones, siltstones and sandstones. Prolonged chemical weathering from a semi-arid, tropical paleo-climate of these relatively soft rocks has produced a layer of laterite/saprolite extending down approximately 80 -100 meters (m) from the surface. A transition zone of partially weathered or oxidized rock (referred to as saprock) is found below the saprolite layer. The transition zone can be highly irregular and ranges from 0 – 20 m in thickness. Below the saprock is fresh or un-oxidized rock. Gold mineralization at the Merian project occurs in all three layers: saprolite, saprock and fresh rock. Based on geologic investigations to date, the gold mineralization is found in what may be a common quartz vein, which is harder than the surrounding host rock.

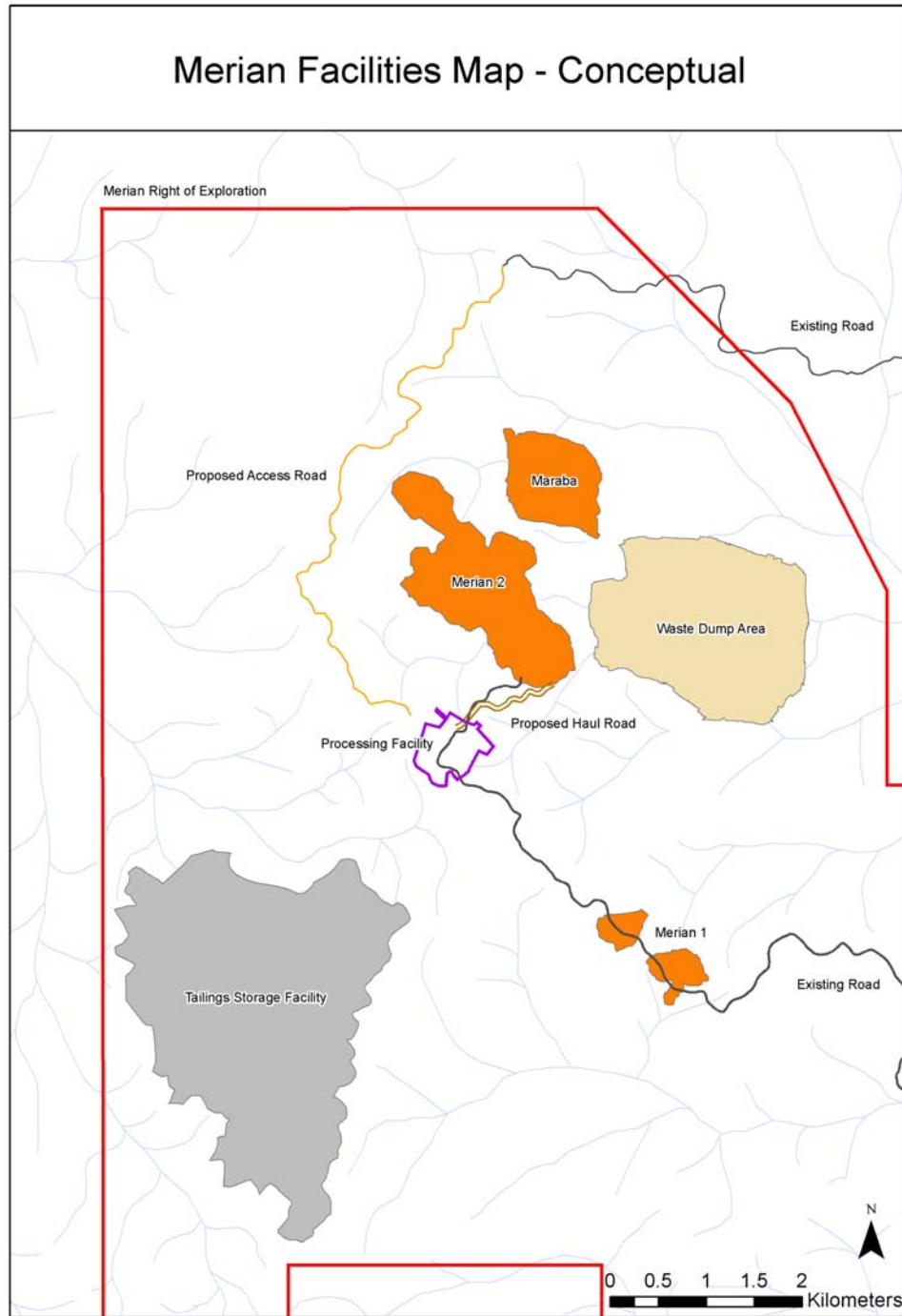
The proposed mine site will comprise three, possibly four, open pits, a processing plant, waste rock management facility and tailings management facility, fuel tank farm, power generation, water treatment facilities, maintenance facilities and offices and worker accommodations. The mine pits and waste rock stockpiles will be located in the Marowijne River watershed while the processing plant and tailings storage facility will be located in the Commewijne River watershed. Figure 2-2 shows the location of the site's major components.

Mining will be performed using a truck and shovel operation (15 and 16 m<sup>3</sup> hydraulic excavators and 140 ton (t) haul trucks with a supporting fleet of dozers and graders) with blasting required only for the fresh rock and some harder saprolite ores. All mining equipment would be diesel powered. These pits are expected to be approximately 170 meters below ground surface with a surface area of approximately 300 hectares (ha).

Waste rock will be stockpiled in two locations: one larger management facility north of the Merian II to serve the Merian II and Maraba pits and a second, smaller facility near the Merian I pit. Based on preliminary geochemical analyses, it is anticipated that the waste rock will be inert and not generate acid drainage. An overall side slope of 3:1 has been allowed with inclined benches of 15 m height to assist drainage and operational effectiveness. In addition, space has been allocated on the northern dump for a low grade stockpile where material will be stored for processing at the end of the mine life.

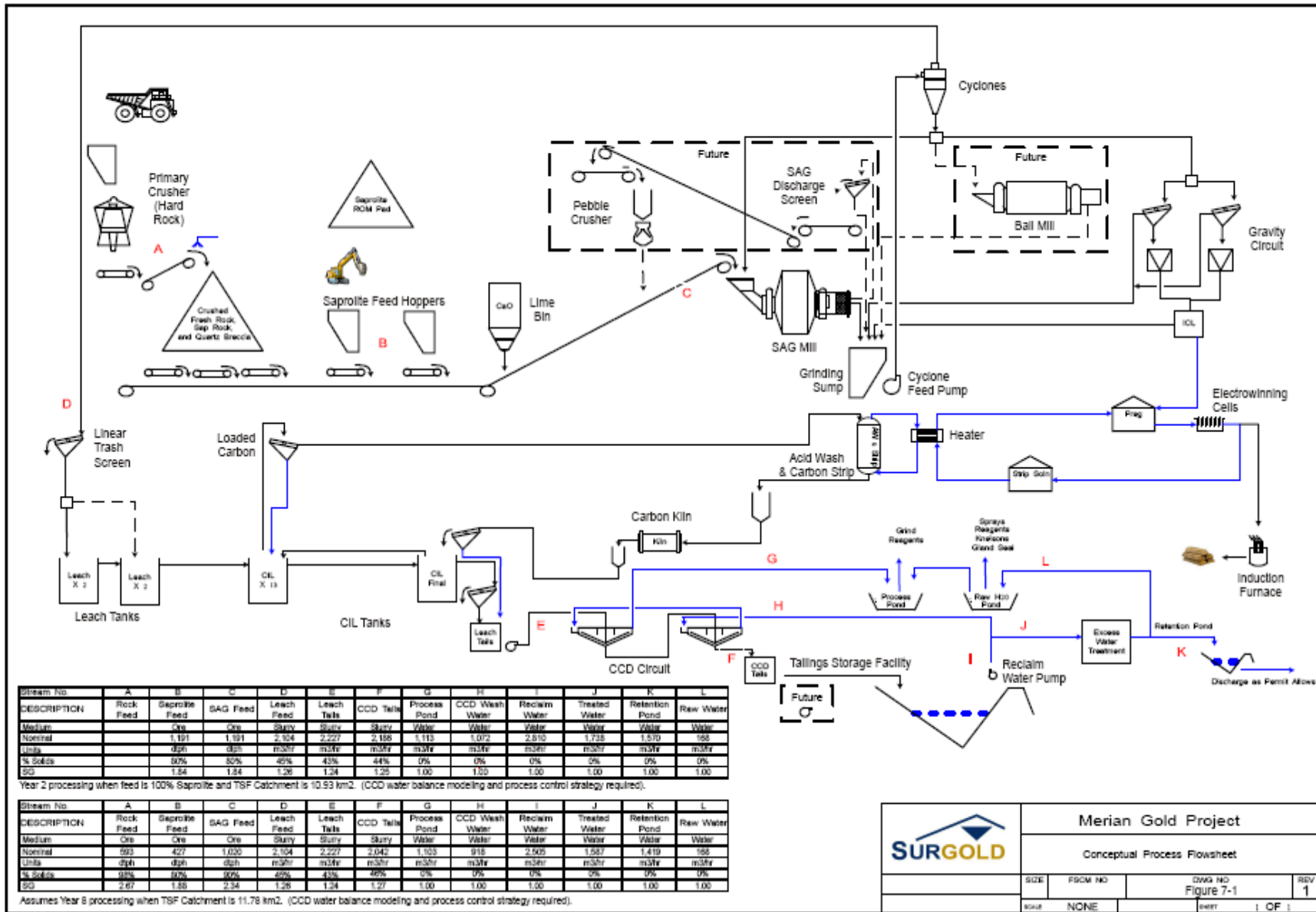
Processing will begin with grinding followed by a combination of gravity recovery and cyanide leach in a Carbon-in-Leach (CIL) circuit with a nominal throughput of 8 Mtpa. When saprock and fresh rock materials become the predominant feed materials, a Ball Mill and Pebble Crusher would be added to the plant in order to maintain the nominal 8 Mtpa production rate. Gold will be recovered from the CIL and the gravity circuits by standard acid wash/strip/electrowinning technology. Cyanide attenuation will be accomplished by washing the leach tails slurry in a two-stage counter current decantation (CCD) circuit to achieve a Weak Acid Dissociable (WAD) cyanide discharge to the tailings storage facility. A process flow diagram is provided in Figure 2-3

Figure 2-2. Mine Site Major Components



Source: ERM; Exploitation Boundary shown is as proposed in the Application for the Right of Exploitation

Figure 2-3. Conceptual Process Flow Diagram – Merian Gold Project



The tailings facility is proposed to be located in the upper reaches of a tributary to the Commewijne River. The facility will include a dam across this upper creek to form a tailings reservoir. Some smaller saddle dams will also be required to contain the tailings. The tailings facility will be constructed in stages as the mining progresses. It is anticipated that discharge to the Tailings Storage Facility for the first 10.8 million tonnes of tailings will be by gravity flow, however it is expected that tailings pumps would be required as part of the second impoundment. Tailings will be pumped to the TSF as of year 1. Tailings deposition will be sub-aerial with cyclic deposition at various locations to allow consolidation and drying of the deposited material. Water from the supernatant pond will be returned to the process plant for process water make-up or for treatment. Excess treated water would be discharged to the environment.

The mine will operate 24-hours/day and the workforce will be housed at the site in worker accommodations during both construction and operations. The workforce during operations is estimated to be 900 employees, for construction this is estimated to be approximately 1,500 - 2,000. Construction employees are anticipated to start work in July - August 2012. The project will operate its own water treatment facility for potable water and wastewater treatment facility.

Project power demand is projected to be 30 megawatts (MW) and will be generated at the site using heavy fuel oil generators.

### 3.0 LEGAL AND REGULATORY FRAMEWORK AND CORPORATE STANDARDS

#### 3.1 INTRODUCTION

Suriname is governed according to the 1987 Constitution of the Republic of Suriname. Suriname does not have an approved environmental policy and there is no legislation dealing specifically with environmental management. Environmental legislation, however, is currently being developed and draft regulations for environmental assessment have been released. In addition, there are several government policies that concern sustainable development and biological resources, including the Government Declaration, the Multi-Annual Development Plan, and the National Biodiversity Strategy. The proposed Merian Project and ESIA process will comply with the draft regulations and other relevant existing legislation, including government policy documents. Responsibility for environmental and natural resource management is fragmented between different pieces of legislation and amongst different government institutions.

In addition to national regulatory requirements, the Project and ESIA process will be consistent with all relevant international standards and requirements (if applicable). These include international treaties and conventions, to which Suriname is a signatory, dealing with biodiversity, climate change and marine pollution. Furthermore, the Project and ESIA process will be guided by international best-practices, notably standards and guidelines such as the IFC Performance Standards that govern environmental and social practices in private sector investments as well as NIMOS EIA guidelines. As a subsidiary of Newmont, which is an international resources company, Surgold must comply with Newmont's corporate standards and management policies including Newmont's Social Responsibility standard.

The legislative, regulatory and institutional requirements guiding the Merian Project and ESIA process are discussed in more detail below. The discussion in this section focuses on the key environmental legislation and obligations that must be considered in the development of the ESIA.

#### 3.2 LEGAL FRAMEWORK

Suriname's legislation at the national level is exercised through Laws or Acts of Parliament (*Wet*, also called *Verordening* and *Landsverordening* prior to 1975),



Decrees (*Decreet*)<sup>iii</sup>, Government Decree (*Staatsbesluit*), Presidential Decree (*Resolutie*), Presidential Orders (*Presidentieel Besluit*) or Ministerial Orders (*Ministeriële Beschikking*) targeting various sectors including industry, tourism, nature conservation, etc.

The Hindrance Act (*Hinderwet*, 1930, 1944, and 1972) defines the permit requirements to control noise and air pollution for industrial development projects. The permits are issued and enforced by local District Commissioners (Buursink, 2005; SRK, 2007); however, the Act's effectiveness has been negatively impacted by outdated and inadequate regulations concerning *inter alia* pollution standards and waste management, and a lack of sufficient resources to conduct monitoring inspections (Buursink, 2005; SRK, 2007).

The Nature Conservation Act (*Natuurbeschermingswet*, 1954) defines the procedures to establish and manage conservation areas and protect wildlife. According to the Act, the only allowable activities in the protected areas are activities of scientific, educational or cultural importance. Conservation areas can be established only by Presidential decree and managed by the Nature Conservation Division of the Forest Service (LBB). The Act does not provide for the protection of sensitive areas outside the established conservation areas.

The Forest Management Act (*Wet Bosbeheer* 1992) replaced the Timber Act of 1947 as the governing regulation for forest exploitation and conservation. The Act classifies forests in Suriname in three ways: permanent, temporary (maintained for the time being), or one-time exploitation forest (land intended for other future use where tree cover will be completely cleared). Resource exploitation in public forests (domain land) is allowable with a permit or forest concession granted by the Ministry of Spatial Planning, Land and Forestry Management (RGB), which issued regulations for logging, deforestation, and processing-related activities. The Forest Management Act also allows the Surinamese government to establish conservation forests.

The major laws, acts, decrees, and orders concerning environmental management in Suriname are described in Table 3-1.

The 2002 draft Environmental Act, currently under review by the Council of Ministers, defines the rules for environmental conservation, management, and protection while promoting sustainable development. The provisions of the act provide guidance for conducting an ESIA in Suriname including:

- Allowing for the creation and implementation of a comprehensive environmental policy and planning process;

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<sup>iii</sup> Decrees date from the period of 1980 - 1986 and have the same status as past or present Laws.

- Establishing the importance of environmental protection and equal consideration of environmental issues with all other considerations;
- Establishing NIMOS as the Environmental Authority in Suriname;
- Giving effect within Suriname to many internationally-accepted principles of Environmental Law, including the principle of precaution, the polluter pays principle and the concept of environmental impact assessment;
- Introducing and giving effect to the Environmental Impact Assessment Guidelines;
- Enshrining the principles of access to information, participation and legal protection for the Surinamese public;
- Allowing for the introduction of suitable regulations to address specific issues of environmental protection; and
- Establishing a framework for enforcement of environmental legislation and regulations, together with penalties.

Currently no legislative basis for the assessment of environmental impacts of development proposals in Suriname exists; however, NIMOS published the draft Guidelines for Environmental Assessment (2009) (including social aspects) in Suriname and project developers are expected to comply with the spirit of the guidelines. The Guidelines also provide guidance for the Surinamese government on determining the suitability of development ESIA's. For a further description of the ESIA process, refer to Section 3.0 of this report.

There are several government policies that have been developed, which concern sustainable development and biological resources, including the Government Declaration, the Multi-Annual Development Plan 2006-2011, and the National Biodiversity Action Plan (2006).

The Government Declaration (Regeringsverklaring 2005-2010) mandates an efficient and effective approach to environmental management. Goals of the Government Declaration include establishing sustainable development practices through the development of a national environmental policy and integrating the environmental policy into the sectoral development policy. The Government Declaration also advocates the promoting environmental awareness and sustainable production.

A Multi-Annual Development Plan (MOP) is drafted every five years and submitted the Parliament for approval. The Plan, which was most recently prepared for 2006-2011, is a government policy that includes a national development strategy for sustainable development and use of biological resources as well as budgetary considerations.

The National Biodiversity Strategy (NBS) establishes goals and strategic directions to be pursued in order to conserve and sustainably use Suriname's biodiversity and biological resources. The NBS provides a basis and a framework for the development of a Biodiversity Action Plan (BAP), which will identify the activities, tasks, outcomes, milestones, responsible actors to implement the strategic directions, including mining.

Table 3-1. <sup>4</sup>Legal Framework for National Environmental Management in Suriname

Title	Objective(s)	Implementing Agency	Comments	Relevance
<b>GENERAL</b>				
Kruispunt, Regeringsverklaring 2011-2015	Overall national sustainable development strategy	Government Statement		Describes the development strategy of the country into which all industry and projects must fit. The developmental impacts of the project will be compared to the requirements of this strategy and efforts will be made to incorporate regional strategy into any developmental projects that Newmont may invest in.
<b>MINERAL RESOURCES</b>				
Mining Decree 1986 SB. 1986 no. 28	1. Governs exploration and exploitation of mineral resources. 2. Article 2 stipulates that all raw materials in and above the ground, including the territorial sea, are property of the State.	MNH	1. Articles 2, 4, 16, 43, 45 are applicable to environmental protection. 2. Contains requirements for consideration of affected communities of Indigenous Peoples. 3. Several implementation regulations have been issued under this decree.	Provides legal expectations and requirements to exploit minerals nationally including consideration of environmental and social impacts.
Government Decree on Mining Installations S.B. 1989 no.38	Provides provisions for offshore mining installations,	MNH	1. Formulated according to: UNCLOS, SOLAS, MARPOL conventions (see Section 2.2.2 on International Agreements). 2. Chapter 3 addresses environmental protection.	Provides legal expectations and requirements to exploit minerals.
Petroleum Law 1990 S.B. 1991 no. 7	Provides provisions for the exploration and exploitation of hydrocarbons.	MNH	Article 6e deals with the management of adverse impacts on the environment.	Provides specific requirements for the management of environmental impacts

<sup>4</sup> These are a list of laws & treaties in Suriname and only some of these could be applicable to the project

Title	Objective(s)	Implementing Agency	Comments	Relevance
Drilling Law G.B. 1952 no. 93	Provides provisions for drilling in Suriname	Head of MNH		Provides specific requirements for drilling programs.
Brokopondo Agreement 1958	Agreement between the Government of Suriname and Suralco LLD concerning the development of hydropower potential.	MNH	No provisions with regard to environmental protection.	Provides context to pre-existing mineral agreements in Suriname.
Gross Rosebel Agreement S.B. 1994 no. 22	Agreement between the Government of Suriname, Grassalco NV and Golden Star Resources Limited for the exploration and exploitation of minerals.	MNH	1. Environmental Impact Statement is required. 2. All activities to comply with Californian legislation.	Provides context to pre-existing mineral agreements in Suriname.
<b>LAND/LAND USE</b>				
Planning Law 1973 GB. 1973 no. 89	Provisions for national and regional planning e.g. land-use policy issues.	Minister of Planning, Planning Coordination Commission and Planning Council.	Contains the mechanism to establish Special Management Areas, to be developed as MUMAs.	Provides planning and land-use requirements.
Law on the Issuance of State Owned Lands 1937 G.B. 1937 no. 53	Provides general regulations on the issuance of State owned lands,	The President	Under this Law, STINASU received a long term lease for the Brownsberg Nature Park.	Provides regulations and requirements to acquire state land.
Construction Law 1956 G.B.1 956 no.30	Provides requirements for the construction of buildings.	Ministry of Public Works		Provides regulations and requirements to construct buildings.
City-Construction Law G.B. 1972 no.96	Provisions for urban development.	Ministry of Public Works		Provides regulations and requirements to affect development. .

<b>Title</b>	<b>Objective(s)</b>	<b>Implementing Agency</b>	<b>Comments</b>	<b>Relevance</b>
Law on Ecological Circumstances in Residential Areas S.B. 1980 no.68	To improve the ecological circumstances in residential areas	District Commissioners		Provides regulations for ecological circumstances in residential areas.
Police Criminal Law GB. 1915 no. 77 as amended		Ministry of Justice and Police	Article 39a penalizes the disposal of waste in public places.	Provides regulations and requirements for waste disposal.
Civil Code G.B. 1860 no. 4			Article 625 deals with ownership/proprietary rights as well as expropriation for the general good prior to compensation.	Provides regulations and requirements for expropriation.
<b>AIR QUALITY AND NOISE</b>				
Hindrance Law G.B. 1930 no. 64 as amended	Controls industrial pollution (noise and air).	District Commissioners issue permits in consultation with Ministry of Health	Permits are required for industrial development projects.	Provides regulations and requirements control industrial pollution.
<b>WATER/MARITIME</b>				
Water Supply Law G.B. 1938 no. 33	Contains prohibitions with respect to water wells, etc. that serve as water supply sources.	MNH, Ministry of Public Health	According to this Law the President is responsible for its implementation, but in practice the ministries assume the role.	Provides regulations and requirements for water pollution.
Water Board Law G.B. 1932 no. 32 as amended	To establish water boards in charge of maintenance of waterways and waterworks within designated areas.	Execution by the water boards, on behalf of the MRD	The manner in which water boards execute their tasks is of importance to the protection, improvement of the living conditions and the maintenance of the quality of the natural environment.	Provides regulations and requirements maintenance of waterways.

Title	Objective(s)	Implementing Agency	Comments	Relevance
Harbors Decree 1981 S.B. 1981 no. 86	Provisions for harbor activities.	Maritime Authority Suriname and District Commissioners , assisted by the Prosecutors office, the Police and the Ministry of Trade and Industry	Prohibits the discharge of waste, oil, and oil-contaminated water and condemned goods into public waterways and harbors.	Provides regulations and requirements for the discharge of water and oil.
Maritime Safety Law SB. 2004 No. 90	Provisions for safety of ships and harbors.	Maritime Authority Suriname, Ministry of Trade and Industry, Maritime Safety Council		Provides regulations and requirements for ship movements.
Decree Multi-Purpose Corantijn Project — Management S.B. 1984 no. 14	To supervise the water management system and to develop, stimulate and manage agricultural activities in the northwest of Suriname.	Multi-Purpose Corantijn Project Management on behalf of LVV		Provides regulations and requirements to control water management for agriculture.
Police Criminal Law GB. 1915 no.77 as amended		Ministry of Justice and Police	In terms of Article 51 the polluting of a water source or water well is liable to a fine.	Provides regulations and requirements for water pollution.
Penal Code G.B. 1911 no.1 as amended		Ministry of Justice and Police	In terms of Articles 224 and 225, contamination of water resources is penalized.	Provides regulations and requirements for water pollution.



Title	Objective(s)	Implementing Agency	Comments	Relevance
Government Decree on Mining Installations SB. 1989 no. 38	Provisions for offshore mining installations,	MNH	It is prohibited to drain or throw overboard substances in concentrations that are hazardous to the marine environment. Protection of the marine environment should be taken into consideration during dismantling.	Provides regulations and requirements for releases to marine environments.
Government Decree on Pesticides G.B. 1974 no. 89 as amended	To implement article 13 of the Pesticides Law	LVV, ATM, Ministry of Public Health	Article 13 Part 2 forbids the removal or destruction of empty containers or remainders of undiluted pesticides in such a manner that water procurement areas or surface waters are polluted.	Provides regulations and requirements for pesticide disposal.
<b>NATURAL ECOSYSTEMS (VEGETATION, FISH, AND WILDLIFE)</b>				
Forest Management Law S.B. 1992 no.80 (replaced the Timber Law of 1947)	Provides a framework for forest management, exploitation, and related sector activities (e.g. primary processing and export) to guarantee sustainable utilization of forest resources. Provides for establishment of conservation forests.	MNH, SBB	<ol style="list-style-type: none"> <li>Permits are required for the exploitation of public forests.</li> <li>Currently 13 implementing resolutions have been issued under the Law</li> <li>The Law also contains a requirement to respect the traditional rights of tribal communities.</li> </ol>	Provides regulations and requirements for forest management.
Nature Conservation Law 1954 G.B. 1954 no. 26 as amended	Wildlife protection, establishment and management of protected areas. Prohibits any activities that may impact on protected areas, except for activities of scientific, educational or cultural importance.	LBB manages nature reserves with the Nature, Protection Commission in an advisory role.	<ol style="list-style-type: none"> <li>Forms the basis for the establishment of nature reserves.</li> <li>Several state-owned lands have been designated nature reserves by Government Decree.</li> <li>No provision for protection of sensitive areas outside of established conservation areas.</li> </ol>	Provides regulations and requirements for wildlife protection.
Government Decree 1998 on Nature Protection S.B. 1998 no.65	Establishment of the Central Suriname Nature Reserve.	MNH, NCD		Provides regulations and requirements for Nature Reserves.

Title	Objective(s)	Implementing Agency	Comments	Relevance
Balata Law G.B 1914 no 51	Provides provisions for research on the availability of 'bolletrie' trees (rubber trees) and the exploitation of balata on state land as well as private land.	The President and Administrator of Finance (implementation), with State Council in an advisory role.	No current balata (rubber) exploitation activities in Suriname.	Provides regulations and requirements for protection of rubber trees.
Plant Protection Law G.B. 1965 no. 102 as amended	1. Provides for control of diseases and pests affecting plants. 2. Prohibits import of plants, compost, soil, etc. without permission. 3. Provides for declaration of protected areas for the protection of plants.	LVV		Provides regulations and requirements for plant protection.
Police Criminal Law GB. 1942 no. 152 as amended			Article 44 requires a permit in order to hunt or to capture wildlife in certain areas of the country's domain, which affords these areas protection.	Provides regulations and requirements for wildlife protection.
Law on Territorial Sea and the Contiguous Economic Zone 1978 SB. 1978 no.26	Determines the economic zone (200 nautical miles) and the extension of the territorial sea to 12 nautical miles in relation with the exploration and exploitation, the maintenance and management of natural resources, living and non-living.	MNH, LVV	The provisions of this Law and requirements thereto can by Government Decree be declared applicable for the protection of the marine environment.	Provides regulations and requirements for protection of the marine environments.
Sea Fisheries Decree SB. 1980 no. 144 (repeals the Fishing Vessels Decree of 1971)	1. Provides for registration, licensing, seaworthiness certification and other requirements for fishing vessels 2. Provides for issuing of regulations for the protection of fish stocks.	LVV	1. Permits required for fishing in the territorial waters and the economic zone.  2. Provides for creation of Advisory Council for Sea Fisheries.	Provides regulations and requirements for releases to marine environments.

Title	Objective(s)	Implementing Agency	Comments	Relevance
Government Decree on Fish Stock Protection GB. 1961 no.144 as amended	Protection of fish stocks in inland waters.	LVV		Provides regulations and requirements for protection of fish stocks.
Game Act 1954 G.B. 1954 no. 25 as amended	Protection of fauna and game management.	MNH	The Economic Offences Law is also applicable.	Provides regulations and requirements for protection of fauna and game.
Hunting Act 1954	1. Prohibits hunting of certain protected animals. 2. Regulates hunting and fishing.	LBB	1. Permits/licenses are required to hunt certain species. 2. Implies that Indigenous Peoples need permission to hunt and fish on State land.	Provides regulations and requirements for protection of fauna and game.
Hunting Decree 2002	Provisions for various animal species, including hunting seasons and numbers allowed,		Protection clause for Indigenous Peoples in the south of Suriname is included.	
<b>CULTURAL HERITAGE</b>				
Law on Historical Monuments GB. 1963 no. 23	Provisions for the preservation of historical monuments, art and architecture in Suriname.	Ministry of Education & Community Development		Provides regulations and requirements for preservation of cultural heritage.
Law of 7 February 1952 G.B. 1952 no. 14	Controls the export of objects that have historical, cultural and scientific value.	Ministry of Education & Community Development	A permit is required to export objects of historical, cultural and scientific value.	Provides regulations and requirements for protection of cultural heritage.
<b>OCCUPATIONAL HEALTH &amp; SAFETY/PUBLIC HEALTH</b>				
Occupational Safety Law G.B. 1947 no.142 as amended	To advance safety and hygiene in enterprises so that the chance of accidents and occupational diseases can be reduced to a minimum.	Ministry of Labor	9 regulations have been issued for the implementation of this Law.	Provides regulations and requirements for health and safety in the workplace.
Labor Inspection Law S.B. 1983 no. 42	Outlines the tasks and responsibilities of the Labor Inspector.	Ministry of Labor	In cases where the safety of persons is in danger, the Inspector has the authority to close the enterprise in question.	Provides regulations and requirements for protection of cultural heritage.

Title	Objective(s)	Implementing Agency	Comments	Relevance
Pesticide Law G.B. 1972 no. 151 as amended	Regulates the trade and use of agrochemicals.	LVV and the Ministry of Public Health	It is prohibited to sell, have in store or use agrochemicals which were not imported according to this Law.	Provides regulations and requirements for the use of agrochemicals.
Mosquito Control Law	To combat mosquitoes and other insects judged to be destructive to the health of human beings and animals.			Provides regulations and requirements for the control of mosquitos.
Water Supply Law G.B. 1938 no. 33	Establishes prohibitions with respect to water wells, etc. that serve as water supply sources.	MNH, Ministry of Public Health	According to this Law the President is responsible for its implementation, but in practice the ministries assume the role.	Provides regulations and requirements for protection of water wells.
Penal Code G.B. 1911 no 1			Article 226 and 227 deals with harmful products. Article 393 pertains to adulterated foodstuffs and medicines.	Provides regulations and requirements for protection of human consumption of foodstuffs.
Movement of Goods Law SB. 2003 no. 74	Provides general rules for international trade	Ministry of Trade & Industry		Provides regulations and requirements for international trade.
Government Decree Resolution Negative List 2003 SB. no. 74	Regulates the international traffic of goods.	Ministry of Trade & Industry	Import and export of chemical waste, pesticides, animals, mercury, radio active materials, etc. are allowed only after the approval of the Government concerning	Provides regulations and requirements for shipping of goods.

Key:

MNH (GMD) - Geologische Mijnbouwkundige Dienst (Geological Mining Service); MNH - Ministerie van Natuurlijke Hulpbronnen (Ministry of Natural Resources); MRD - Ministry of Regional Development; LVV - Ministerie van Landbouw, Veeteelt en Visserij (Ministry of Agriculture, Animal Husbandry and Fisheries); LBB - Lands Bosbeheer (Forestry Service).

The Republic of Suriname has several Acts, bills and regulations dealing with environmental and/or natural resource management; however, there is no national law on environmental management. The Constitution of the Republic of Suriname (1987) supports the creation and improvement of “conditions necessary for the protection of nature and for the preservation of the ecological balance.” As such, it provides a legal basis for a national environmental policy. A National Environmental Action Plan (NEAP) was compiled in 1996 and, although it has not been formally approved, some of its proposals have been implemented, such as the establishment of an institutional framework for environmental management and sustainable natural resource use.

The Nationale Milieuraad (NMR - National Council for the Environment) was established in 1997 with a mandate to advise the government of Suriname on the development and implementation of national environmental policies. The NMR consists of a chairperson and 5-10 members representing government, private sector, Amerindian and Maroon communities, labor unions, consumer rights, and other Non-Governmental Organizations (NGOs).

Executive support for the NMR is provided by the Nationale Instituut voor Milieu en Ontwikkeling in Suriname (NIMOS - the National Institute for Environment and Development in Suriname). NIMOS was originally established in 1998 by Presidential Decree as an entity subordinate to the President’s office, and was later ordered by the President to report to the Ministry of Labor, Technological and Environment (ATM) as its technical division in 2001. NIMOS is the main environmental management policy and advisory body and also acts as a research institute. Suriname’s Biodiversity Action Plan is being managed by NIMOS under the guidance of Ministry of ATM and the Biodiversity Steering Committee (BSC). NIMOS had a role in the implementation of the Biodiversity Action Plan. The Ministry of ATM is the focal point.

Suriname’s Government Declaration (2005-2010) and the Multi-Annual Development Plan (2006-2011) specify environmental management policies, but in the preliminary stage of development, and focus on objectives of the national environmental policy. In the absence of dedicated national environmental legislation, the responsibility for environmental (and social) issues remains widely spread between a number of agencies and departments in other ministries. These agencies and departments, and their role in environmental (and social) issues are described in Table 3-2.

**Table 3-2. Environmental Management Responsibilities of Key Institutions in Suriname**

Environmental Management Aspects	Institutions							
	ATM	Sectoral Ministries	NIMOS	STINASU	SCF	District Commissioners	NCD (LBB)	SBB
Nature conservation and management			Facilitation of National Biodiversity Strategy	Browns-berg Nature Park	CSNR and Sipaliwini Nature Reserve		Creation of new protected areas, management, and control	Management of forests
ESIA processes		Approval of development projects and enforcement	Guidance and review of reports. Provides advice regarding environmental planning, but the final decision is still the responsibility of permitting agency.					
Industrial pollution			Technical advice; Enforcement			Permit approval	Enforcement	
Monitoring		Implementation	Supervision; Enforcement				Implementation	Implementation
Environmental Planning (Management Plans)		Participation in design and plan implementation	Coordination of design and plan implementation				Participation in design and plan implementation	
Environmental Regulations	Approval	Enforcement	Drafting and stakeholder consultation					
Forest Development							Permits approval and control of forest management plans	Monitoring of logging activities

Key:

ATM - Ministry of Labor, Technological Development and Environment; NIMOS - National Institute for Environment and Development in Suriname; CSNR - Central Suriname Nature Reserve; STINASU - Foundation for Nature Conservation in Suriname; SCF - Suriname Conservation Foundation; NCD - Nature Conservation Division; LBB - Suriname Forest Service; SBB - Foundation for Forest Management and Production Control

## 3.4

**INTERNATIONAL STANDARDS AND GUIDELINES**

Suriname is signatory to a number of international agreements and conventions relating to environmental management, community rights and Indigenous Peoples. The international conventions are not always translated into national legislation. Some of the key agreements are listed in Table 3-3.

**Table 3-3. International Agreements Relevant to Environmental and Social Issues in Suriname**

Agreement/Convention	Notes/Comments	Status	Relevance
<b>CLIMATE CHANGE/AIR QUALITY</b>			
Vienna Convention for the Protection of the Ozone Layer, 1985	Protection of the ozone layer, came into force in 1988,	Suriname acceded in 1997.	Sets international standards for protection of the ozone layer; emissions from project potential to harm ozone layer
Montreal Protocol on Substances that Deplete the Ozone Layer, 1989	Protection of the ozone layer.	Suriname acceded in 1997 but subsequent amendments not yet ratified.	As above
United Nations Framework Convention on Climate Change (UNFCCC), 1994	Control of greenhouse gas emissions.	Ratified by Suriname in 1997.	Sets international guidelines on restrictions of GHG emissions in order to prevent climate change; Project will emit greenhouse gases from power generation through heavy fuel combustion
Kyoto Protocol, 1997	Greenhouse gas emissions targets.	Ratified by Suriname in 2006.	As above
<b>BIODIVERSITY/PROTECTED AREAS</b>			



Agreement/Convention	Notes/Comments	Status	Relevance
Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (Western Hemisphere Convention), 1942	Provisions to establish a set of protected areas; national parks to provide recreational and educational facilities; strict wilderness areas to be maintained inviolate; co-operation in the field of research between governments; species listed in annex to enjoy special protection and controls to be imposed on trade in protected fauna and flora and any parts thereof.	Signed by Suriname in 1985. Suriname has three Western Hemisphere Shorebird Reserves: 1. Coppenamernonding 2. Bigi Pan 3. Wia Wia	Sets international requirements for the protection and preservation of nature/wildlife; project is in a high-biodiversity area and has potential to impact local wildlife and natural environment.
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention), 1971	The conservation and sustainable utilization of wetlands, i.e. to stem progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.	Came into force for Suriname in 1985. The Coppename Rivermouth is a Ramsar site (and Western Hemisphere Shorebird Reserve)	Sets international requirements for the protection of wetlands; project has potential to impact local wetland area
Convention on the International Trade of Endangered Species of Wild Fauna and Flora (CITES), 1973	To ensure that international trade in specimens of wild animals and plants does not threaten their survival and it accords varying degrees of protection to more than 33,000 species of animals and plants.	Ratified by Suriname in 1980. New game regulations to comply with CITES requirements were passed in 2002.	Sets international restrictions/bans on trade of certain wild animals/plants. Project takes place in high biodiversity area
United Nations Convention on Biological Diversity, 1992	Promotes development of national strategies for the conservation and sustainable use of biological diversity. Often seen as the key document regarding sustainable development.	Ratified by Suriname in 1996. A National Biodiversity Strategy (2006) has been compiled as framework for a National Biodiversity Action Plan.	Sets guidelines for protection and promotion of biological diversity. Project takes place in high biodiversity area.
United Nations Convention to Combat Desertification, 1994	To combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements.	Ratified by Suriname in 2000. As part the implementation of this convention, a national report has been compiled. Currently discussions are underway on how to implement the convention in a more effective and efficient manner, The development of national action plan is prerequisite.	Sets guidelines to combat desertification. Project has potential to impact local water resources and quality and land use

Agreement/Convention	Notes/Comments	Status	Relevance
<b>FOREST MANAGEMENT</b>			
International Tropical Timber Agreement, 1994 (Tropical Timber 94)	To ensure that (by the year 2000) exports of tropical timber originate from sustainably managed sources and to establish a fund to assist tropical timber producers in obtaining the resources necessary to reach this objective.	Suriname acceded in 1998.	Sets international targets for sustainable export of tropical timber; Project has potential to impact local forested area
American Convention on Human Rights, 1969	International human rights instrument to establish a system of personal liberty and social justice based on respect for the essential rights of man, within the framework of democratic institutions. The bodies responsible for overseeing compliance are the Inter-American Commission on Human Rights and the Inter-American Court of Human Rights, both of which are organs of the Organization of American States.	Ratified by Suriname in 1987	Sets framework for protection of human rights; project has impact to affect lives of those living in local community
<b>CULTURAL HERITAGE</b>			
UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972 (World Heritage Convention)	Promotes cooperation among nations to protect heritage from around the world that is of such outstanding universal value that its conservation is important for current and future generations.	Ratified by Suriname in 1997. Suriname has two World Heritage Sites: 1. Central Suriname Nature Reserve 2. Historic Inner City of Paramaribo	Sets guidelines for the conservation of significant heritage/cultural sites.
<b>INDIGENOUS PEOPLE</b>			
UN formulation of Declaration on Rights of Indigenous People, 1994.  UN approval of Declaration on Rights of Indigenous People, 2007.	Promotes rights of indigenous people	Signed by Suriname	Sets standards for protection of indigenous people. Project has potential to impact tribal groups.
<b>REGIONAL DEVELOPMENT/COOPERATION</b>			
Amazon Cooperation Treaty, 1978 (amended in 1998)	Aimed at the promotion of sustainable development of the Amazon Basin. Member states are Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela.	Suriname is a founding member,	Sets guidelines to promote sustainable development of the Amazon basin; project taking place in the Amazon

Agreement/Convention	Notes/Comments	Status	Relevance
<b>LABOR/HEALTH/SAFETY</b>			
Constitution of the International Labor Organization	Promotes opportunities for women and men to obtain decent and productive work, in conditions of freedom, equity, security and human dignity.	Suriname member since 1976.	Sets international labour standards; project will employ large workforce
Constitution of the Pan American Health Organization	To improve health and Irving standards of the countries of the Americas.	Suriname member since 1976.	Sets guidelines to improve health and living standards; project has potential to impact local health/living standards.

Source: SRK, 2007

### 3.5 CORPORATE REQUIREMENTS AND GUIDELINES

Surgold is subject to the corporate requirements of its parent company Newmont Mining Corporation. Community consultation is an important component for any new project Newmont undertakes anywhere in the world, including those proposed for the Merian Project.

Newmont has established internal standards that outline the company's approach to its design and operations of aspects of its business that impact people and the environment and set out minimum requirements such that human health and the environment are protected. The corporate standards address such aspects as:

- Air Quality Management
- Water Management
- Waste Management
- Waste Rock Management
- Tailings Management
- Mercury management
- Cyanide Management
- Chemical Management
- Hydrocarbon Management
- Closure and Reclamation Planning
- Social Responsibility Standards

These standards are incorporated into project design; management systems and monitoring programs to ensure environmental and social impacts are appropriately managed and mitigated as needed.

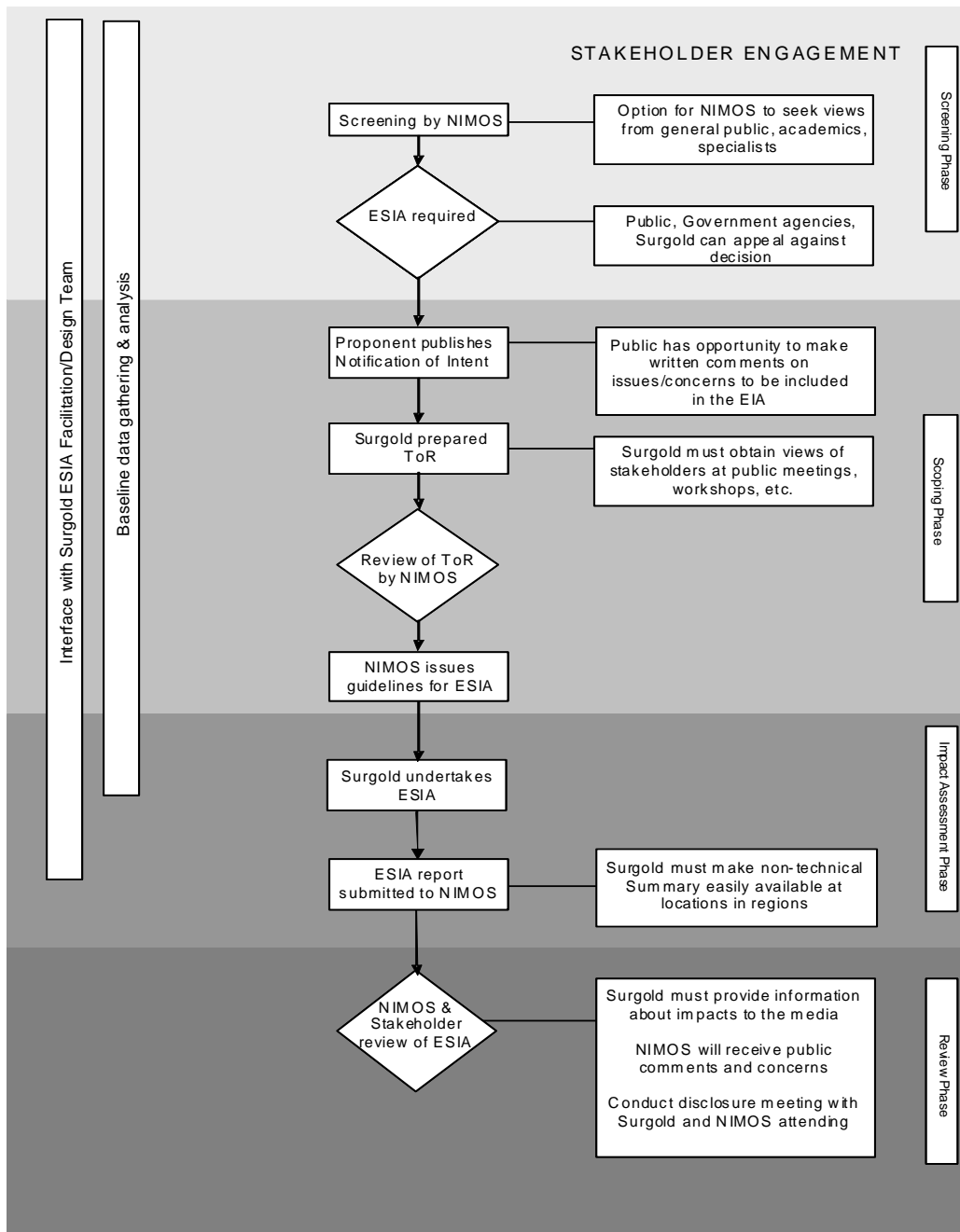
To address potential impacts associated with the Merian Project and the issues and concerns raised by stakeholders, an ESIA will be prepared for the Merian Project that will:

- Assist NIMOS in preparing recommendations for evaluating the proposed project, as well as ongoing environmental management of the project;
- Inform Newmont's decisions on investment in the project, in accordance with Newmont's policies and standards; and
- Meaningfully engage stakeholders throughout the project, to ensure that the public's views on the project are taken into consideration by decision-makers.

Stakeholder engagement, consultation and disclosure of information with all stakeholders, including any affected communities of Indigenous Peoples and Maroons, will form a continuous and important part of the process. Further details regarding the stakeholder engagement process are contained in Section 5.0 of this report.

The approach to the ESIA comprises four phases identified in the NIMOS Environmental Assessment Guidelines (NIMOS 2009; NIMOS, 2005a): Screening, Scoping, Impact Assessment, and Disclosure. The Screening phase is an initial identification of the main issues the project will be facing. During the Scoping phase, the full parameters of the baseline studies and impact assessment will be identified. The Impact Assessment phase identifies the baseline conditions for the project, measures the impacts against that baseline, and develops mitigation measures, where required. The Disclosure phase involves sharing the results of the ESIA with the public, government, and other stakeholders and receiving their comments. This approach allows Surgold to comply with the legal requirements for an environmental assessment in Suriname as well as the relevant international and corporate standards and requirements (refer to Section 3.0 of this report). The ESIA process is summarized in Figure 4-1.

Figure 4-1. The Suriname ESIA Process and the Merian Project



Source: ERM

## 4.1

### *SCREENING PHASE*

The Screening phase is the initial phase of the process outlined in the Surinamese draft Environmental Act to decide if an Environmental Assessment (EA) is required for the proposed Project and determine the extent of the required environmental analysis. The NIMOS EA guidelines identify three project categories (A, B, and C) and indicate that an EA is mandatory for all Category A projects. Category A projects are “likely to have adverse impacts that may be extensive, irreversible, and diverse. The extent and scale of the environmental impacts can only be determined after thorough environmental assessment.” In accordance with NIMOS guidelines for screening projects, any non-metallic mining project that will affect greater than 20 hectares of land is a Category A project for which a comprehensive environmental assessment (ESIA, in this case) is mandatory. The Merian Project is currently in the process of completing the Screening phase, however, given NIMOS’ guidelines, it has been assumed that the project will be screened as a Category A and therefore Surgold has continued to move the project’s ESIA process forward.

## 4.2

### *SCOPING PHASE*

In the Scoping phase, the key issues identified during Screening will be further investigated through desktop analysis and stakeholder interviews to ascertain whether additional information is needed to evaluate baseline conditions and potential impacts within the Project Area. The desktop evaluation includes reviewing applicable environmental and social data collected from external sources with published information and previous studies of the Project Area. The Project Sponsors will meet with stakeholder groups (e.g., federal governmental agencies and officials, district agencies and officials, NGOs), and representatives of local communities to discuss the scopes of the currently proposed studies including alternatives and the criteria for the impact assessment and determine if additional baseline data will be required for a comprehensive analysis. The key objectives for the Scoping phase are:

- Identify stakeholders and inform them of the proposed Project and the ESIA process;
- Provide stakeholders with the opportunity to identify any issues and concerns associated with the proposed Project;
- Identify areas of likely impact and environmental and social issues that may require further investigation in an ESIA (including the initial results of the screening phase);
- Determine the ToR for specialist baseline and impact assessment studies in response to initial stakeholder input; and

- Release the Scoping Phase Report, including draft ToR for specialist studies, for stakeholder review and comment.

### 4.3

#### *IMPACT ASSESSMENT PHASE*

The impact assessment phase generates the baseline (pre-project) environment, assesses the significance of the potential impacts identified, including cumulative effects, during scoping, and identifies mitigation measures that could minimize negative impacts and/or enhance benefits. The biophysical and social findings will be integrated into the ESIA, which will be the main document on which environmental decisions regarding the project are based. During the impact assessment phase, Environmental and Social Management Plans (ESMPs) will also be prepared to guide environmental and social management issues during the operational and subsequent phases of the Project. The proposed ESMPs include an Environmental Management Plan, a Social Management Plan, an Emergency Response Plan, a Closure and Rehabilitation Plan, and a Monitoring Plan (see Section 7.3). These Plans will be integrated in the ESIA report. The key objectives of the ESIA are to:

- Document and contextualize the ecological and socioeconomic baseline conditions of the study area and the affected communities;
- Inform and obtain contributions from stakeholders, including governmental authorities, the public, and indigenous communities and address their relevant issues and concerns;
- Assess in detail the environmental and social impacts that would result from the project;
- Identify environmental and social mitigation measures to address the impacts assessed;
- Develop the ESMPs as discussed above, based on the mitigation measures developed in the ESIA;
- Meet the requirements of the environmental regulations in Suriname;
- Be guided by the policies, guidelines and procedures of the Equator Principles; and
- Be consistent with Newmont's policies and corporate values.



#### 4.4

#### ***THE DISCLOSURE PHASE***

The purpose of the Disclosure or Review Phase is to allow NIMOS, other government agencies, the affected communities, interested NGOs, and other stakeholders to have the opportunity to review and comment on the Draft ESIA. This is a critical period for the project.

The phase begins with a Preliminary Draft ESIA, which will be reviewed by Newmont and then submitted to NIMOS and made available for public disclosure. The project will distribute copies to all key stakeholders (a list of stakeholders will be developed throughout the ESIA process). Typically NIMOS, other government agencies, and interested NGOs would receive full copies of the Draft ESIA (5 hardcopies of the Draft ESIA report and one soft copy will be submitted to NIMOS). Most other stakeholders would receive the Executive Summary in Dutch. Surgold will also post both the full Draft ESIA and the Dutch version of the Executive Summary on its Project website

Public Disclosure Meetings will be conducted in either Dutch or Sranan Tongo. The same number of meetings in generally the same locations as those conducted during Scoping is currently foreseen. Typically these meetings should occur prior to the release (within about 20 days of the anticipated release) of the Draft ESIA such that the public can listen to the presentations and have many of their questions answered before needing to submit comments. Typically comments are accepted for 30-45 days after public disclosure.

Based on the comments received from NIMOS, local communities, and other stakeholders, ERM will prepare a Final ESIA that addresses these comments. Two hardcopies and one soft copy of the Final ESIA report will be formally submitted to NIMOS.

#### 4.5

#### ***THE INTEGRATED ESIA APPROACH FOR THE MERIAN PROEJCT***

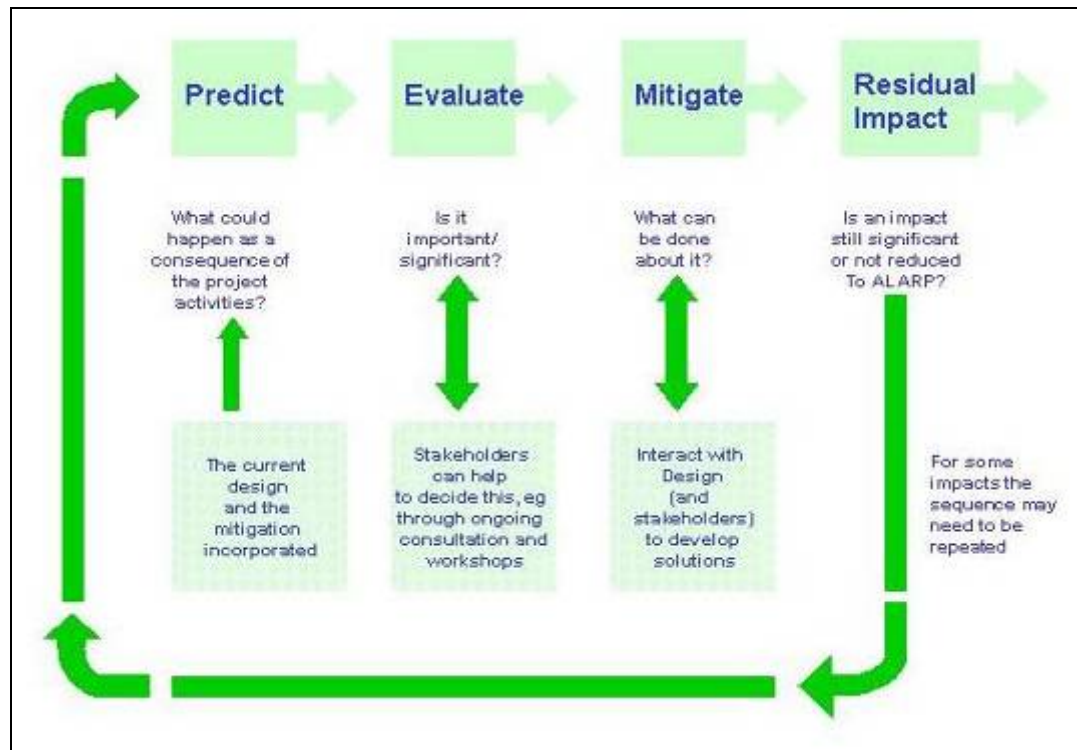
Surgold has decided to undertake an integrated approach to the ESIA process given that environmental, social and health impacts are interrelated. Impacts are naturally cross-cutting: an “environmental” impact such as a change in biodiversity becomes a “socio-economic” or “health” impact as soon as it affects the well-being of people who depend on natural resources for their livelihood. Many social and health impacts are secondary impacts of environmental impacts. Social impacts (e.g., in-migration of those seeking work and economic opportunities) can similarly lead to environmental consequences. Furthermore, all mitigation strategies designed must take into account consequences across environmental, social and health issues. An integrated approach prevents, for example, an environmental specialist designing a mitigation measure in isolation

that could have unidentified social repercussions, or two specialists designing conflicting measures. Therefore, a comprehensive understanding of a project's impacts requires multi-disciplinary analysis.

The Surgold approach reflects the requirements of an integrated approach:

- The ESIA team includes environmental, engineering, social and health specialists who have worked together on several other integrated ESIA's.
- Topics- such as community use of natural resources in the area- that cut across environmental, social and health issues will be assessed in a multi-disciplinary manner by all relevant specialists. They will work together throughout the impact assessment to ensure that the issue is assessed in a truly integrated way.
- Consultation will cover all facets of the issues. ESIA team members involved in stakeholder meetings will be able to discuss aspects of any issues that may be raised by a stakeholder. ERM does not consider public consultation as a stand-alone exercise or ESIA activity, but conceives of it as a thread that runs through the ESIA, closely connecting and interacting with the other core elements of the process. ERM's approach to impact assessment is to involve stakeholders, through consultation, in identifying impacts, developing appropriate mitigation and enhancement measures and evaluating the significance of residual impacts.
- Integration between the project design team and the environmental and social teams will be required. Figure 3-2 shows how the impact assessment cycle within the ESIA process is an iterative one with a strong link into project decision-making and design. Close collaboration between the ESIA and design teams allows design to be challenged in an ongoing way, and to be adapted where it should and reasonably can.

Figure 4-2. *Impact Assessment Cycle*



Source: ERM

Consultation with stakeholders is a key aspect of the ESIA process. The consultation process gives stakeholders an opportunity to comment on the proposed project as well as on the reports that are produced during each phase of the ESIA. This enables the affected communities to actually be a part of the solutions when it comes to mitigating impacts or implementing management measures. The field studies will involve the use of Participatory Rural Appraisal (PRA) techniques that enhance participation through focus group discussions, resource mapping and transect analysis.

Local and traditional leaders, representatives of the communities, potential vulnerable groups such as women and youth will be consulted to understand their specific issues and concerns. This will enable meaningful participation of the affected sub-sections of the communities in the studies. The findings and recommendations will be discussed and disclosed in an open and transparent manner with the affected people in order to solicit their comments and suggestions in the studies.

Deliverables that will be presented in public meetings shall include Powerpoint presentations in traditional languages(s) with key project messages including:

- Expectations management around capacity building (employment, purchasing, contracting)
- Infrastructure development

Surgold has already made efforts towards stakeholder engagement particularly with the Maroon villages that fall within the Project's social study area. Surgold has a Community Relations Team that is responsible for community engagement and development activities especially in the Maroon villages along the river.

Over the years several stakeholder related activities have been conducted such as:

- Health Studies (NewFields Consulting)
- Formulation of a Community Development Platform
- Regular meetings in villages with the Granman and larger communities
- Local employment for some villagers
- Artisanal mining related consultations
- Ongoing communication about expectations and issues with the project

The consultation process will build on the existing activities described above and will be designed to comply with the requirements for public consultation as prescribed in Suriname's draft Environmental Legislation (NIMOS, 2005b) and

the IFC Performance Standard guidelines for stakeholder engagement. The basic principles of the consultation will be to ensure that the ESIA and engagement process is inclusive, culturally sensitive and transparent.

## **5.1 AIMS AND OBJECTIVES OF THE PUBLIC CONSULTATION**

The purpose of public consultation during the ESIA is to ensure that the views, interests, and concerns of Project stakeholders are taken into account in the assessment of the potential impacts of the project as well as in project decisions, particularly in the design of mitigation measures. In addition the public consultation aims to improve communication between the project and impacted or interested groups. The main focus is therefore:

- Stakeholder identification and analysis;
- Type of consultation activities to be undertaken with each category of stakeholders;
- Information disclosure, specifically the provision of timely and meaningful information that is accessible to all stakeholders;
- The approach to and mechanisms for obtaining stakeholder feedback on the information disclosed;
- Principles and ground rules guiding consultation with local communities; and
- The program for consultation to ensure timely notification of consultation activities and to tie in with key stages in the ESIA process.

## **5.2 DRAFT CONSULTATION PLAN**

A summary of the Consultation Plan is presented in Table 5-1, below. The Consultation Plan maps out the stakeholder engagement process in each phase of the ESIA study. The Plan is adaptive and subject to change based on stakeholder responses/requirements. A combination of various types of consultation techniques will be used like face to face meetings, focus group discussions (qualitative discussions with sub groups within communities like women, youth, and indigenous people), public meetings and sample household socioeconomic surveys.

The overall consultation process will be designed to comply with the requirements for public consultation as prescribed in Suriname's draft environmental legislation and IFC's Performance Standard guidelines for stakeholder engagement.

**Table 5-1. Draft Consultation Plan - Merian Project**

ESHIA Phase	Consultation Plan	Estimated Timeframe
Screening Phase	Initial meetings with Surgold (project proponents).	<i>June 2011</i>
	Scoping/face to face meetings with NIMOS  NIMOS visit to the Merian Project	<i>June-July 2011</i>
Scoping Phase	Meeting with Captains, Basjas and Head Captains	<i>July- August 2011</i>
	Distribution of draft ToR to key stakeholders like NIMOS  Arrangements for the draft ToR to be made accessible to the local communities by making it available on a website and/or locations from where it can be distributed.	
	Notify communities and other stakeholders of public meetings to be held for the ToR consultation. Methods such as advertisements, posters and public announcements will be used to notify the stakeholders.	<i>August 2011</i>
	The first round of public meetings will be held to inform the stakeholders about the project, the ESHIA study and to solicit feedback and concerns on draft ToR for the project. The public meetings are proposed in few locations like Paramaribo, Moengo and Langatabiki,  A feedback mechanism will be established such as response forms, key contact points so that the stakeholders may provide their feedback and comments.	<i>August 2011</i>
Impact Assessment Phase	Specialist studies will be conducted such as biodiversity, terrestrial ecology, socio-economics, hydrogeology etc. During the course of these specialized studies consultations will be held with relevant stakeholders.	September – January 2011
	As a part of the fieldwork, household surveys and consultations will be done in the following villages: <ul style="list-style-type: none"> <li>• Akaati</li> <li>• Atemsa</li> <li>• Bada Tabiki</li> <li>• Kiki Mofo</li> <li>• Langatabiki</li> <li>• Loka Loka</li> <li>• Nason</li> <li>• Pakira Tabiki</li> <li>• Skin Tabiki</li> <li>• Tabiki Ede</li> </ul>	
Disclosure Phase	After the first draft of the ESHIA has been prepared another round of public consultations will be held to share initial findings and solicit stakeholder feedback in the ESHIA.	March/ April 2012
	Distribute draft ESHIA for public comments (through NIMOS)	April-June 2012
	Solicit final comments from the stakeholders (deadline for public comments).	June 2012

*Note: italics represent meetings/consultations already conducted.*

The review, publication and disclosure of the ESIA will include:

- Distribution of the ESIA report to NIMOS, government and other interested groups;
- Public meetings to present the assessed impacts, the assessment and mitigation / management measure; and
- To receive public comments and recommendation on the impacts and mitigation measures.

Based on the available data, key potential impacts that will require further investigation and analysis that we have identified to date include:

- Potential for the project to impact water quality specifically with respect to:
  - Tailing and waste rock seepage
  - Management of erosion and sediment
  - Mine water management
- Potential for groundwater drawdown from pit dewatering and discharge of pit water
- Potential increased risks to the environment related to waste management and the use of cyanide and the need to establish a robust environmental management plan
- Potential for the project to impact biodiversity since Suriname is a recognized high-biodiversity area (IFC Performance Standard 6)
- Potential for non-routine or uncontrolled releases from the tailings storage facility possibly resulting in:
  - contamination of soils, ground and surface water;
  - disturbance to flora and fauna and resultant;
  - impacts to human health; and
  - impacts to the practice of traditional collection of Non-Timber Forest Products (NTFPs) or hunting activities.
- Potential for the project to impact fish and aquatic resources through water quality and quantity impacts resulting in
  - Potential impacts on downstream fisheries
  - Potential effects on any subsistence fishing
- Potential for the project to impact air quality specifically through
  - Combustion emissions from heavy fuel oil generators (30 MW Power Plant)
  - Fugitive dust emissions from surface disturbance at the mine site and along the transport roads.
- The need for mine closure and restoration planning
- Potential impacts from the transportation corridor specifically regarding:
  - Community health and safety concerns



- Existing sensitive receptors
- Capacity of existing network to absorb additional traffic
- Cumulative impacts from other projects

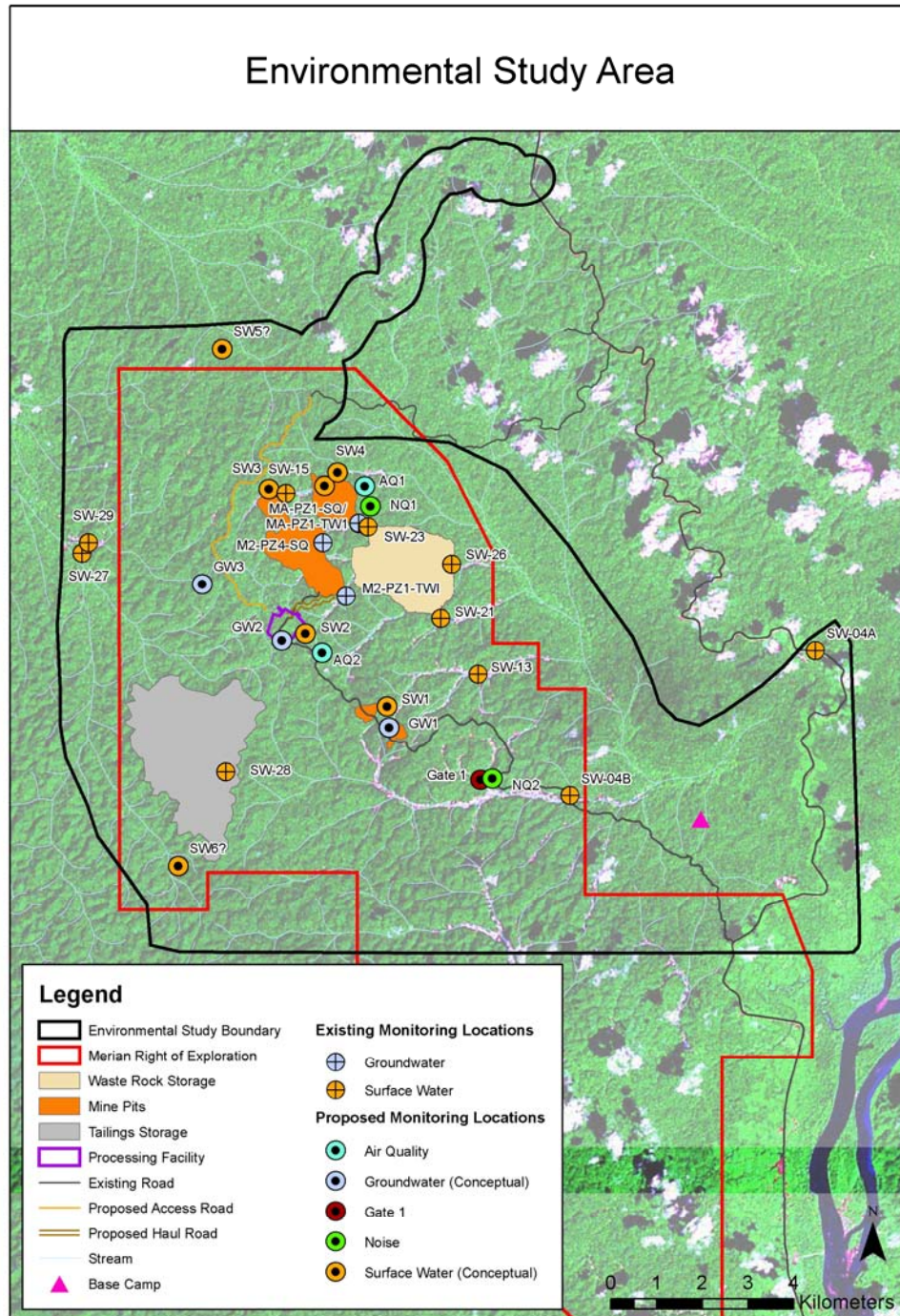
The issues listed above were identified based on the following studies and/or stakeholder feedback:

- Surgold feasibility studies, which includes surface and groundwater sampling reports;
- Initial coordination meetings for the ESIA study held on June 14, 2011. This included technical personnel from Surgold, Newmont, Golder, G-Mining, and ERM;
- Kick-off meeting at Merian office at the base camp on 27 April 2011. This included Project team members from Surgold (Percy Montoya, Claudio Ballon, Wendell Asadang, Mike Meyer), ERM, and a local sub consultant;
- Visit to the Mine Site on 28 June 2011 (visual observation of site, streams, porknorking activities, etc);
- Through consultations with government agencies (NIMOS) on 30 June 2011; and
- Through conference call with Golder on 20 July 2011 to discuss sampling locations for surfacewater and groundwater wells. This included technical personnel from Surgold, Golder, and ERM.
- Comments received during the Public Meetings conducted during August 2011 in Paramaribo, Moengo, and Langi Tibiki

An Environment Project Study Area and a Social Project Study Area have been established to define the scope of the areas that will be studied for the purposes of the ESIA (Figures 7-1 and 7-2). The following section details the proposed field and desktop studies that will be undertaken to determine baseline conditions and potential impacts of the project.

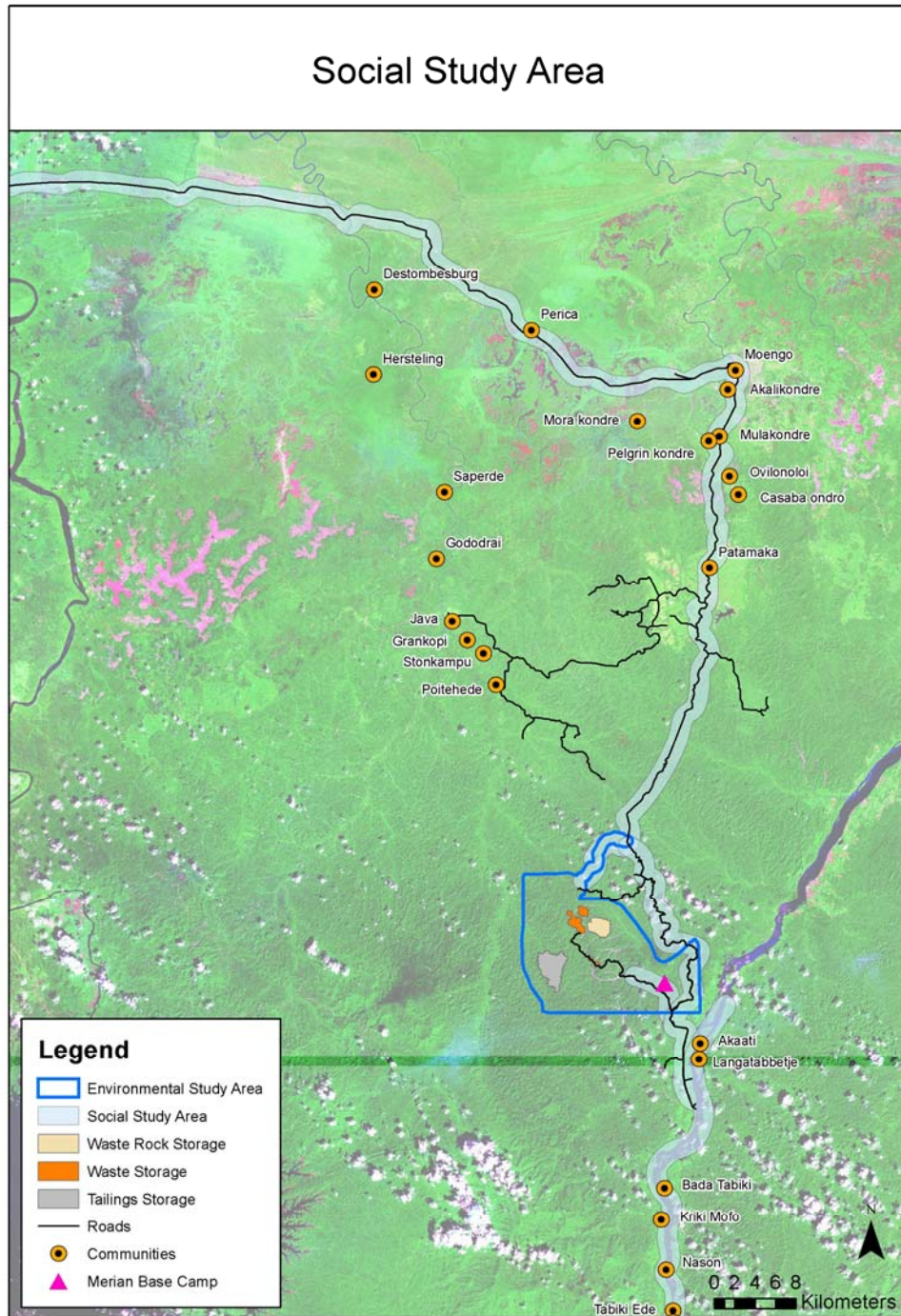
The demarcation of the environmental study area was based on previous understanding of the project, Newmont's continued environmental monitoring work, proposed project footprint (access roads, tailing area, mine facilities etc.) and stakeholder consultations. Similarly the determination of the social area(s) or communities to be studied is based on our previous knowledge of the project area, inputs from Newmont's community engagement programme and understanding of the project footprint and potential impacts on the communities.

Figure 7-1. Environmental Study Area



Source: ERM

Figure 7-2. Social Study Area



Source: ERM



## 7.1 *PROPOSED STUDIES*

This section describes the proposed environmental, social, and health studies that will be undertaken as part of the ESIA process for the Merian Project.

The primary purposes of these studies are to describe the current (baseline) conditions at the mine site and preferred transport road corridor, including historic and ongoing activities (e.g., exploration and small scale mining). The results of the studies will serve as the basis to identify the potential environmental, socioeconomic, and health impacts from the Merian Project. The socioeconomic studies will be integrated with the Stakeholder Engagement Strategy and outreach activities to maintain a consistent interaction with stakeholders.

### 7.1.1 *Environmental Specialist Studies*

Nine environmental specialist studies (ESS) will be conducted on the selected transport road corridor and in the vicinity of the proposed mining and processing plant area:

1. Groundwater Study
2. Surface Water Flow and Quality Study
3. Air Quality and Climate Study
4. Noise Study
5. Flora Studies
6. Soil Study
7. Aerial Fauna Studies
8. Terrestrial Fauna Studies
9. Fish and Aquatic Habitat Baseline Studies

More detailed technical descriptions of the specific studies are available in a separate document.

#### 7.1.1.1 *Environmental Specialist Study 1: Groundwater Study*

Investigation and analysis of the hydrogeology, or groundwater, characteristics of the site have been on-going since 2009. Groundwater conditions can have impacts on the project design as well as being impacted by the project. Continued investigations will focus on the potential impacts of the pits on groundwater levels in the area and the resulting impacts on streamflow and

ground water quality as well as the potential impacts to groundwater resulting from waste rock or tailings seepage. Groundwater investigations will include continued monitoring of existing wells for water levels and water chemistry, and additional wells located in the Commewijne and Marowijne drainage area to determine baseline conditions in the tailings storage facility area and potential groundwater-surface water interaction in the Commewijne and Marowijne drainage basins. Groundwater data will be collected regularly throughout the seasons and analyzed by a laboratory for a wide suite of parameters including major ions, metals, physical parameters and cyanide. Field parameters such as temperature and pH will also be measured. Groundwater modeling will be undertaken to understand the flow directions within the geologic formations and assess potential impacts from Project activities.

#### 7.1.1.2 *Environmental Specialist Study 2: Surface Water Flow and Quality Study*

Investigation and analysis of the hydrology, or surface water, characteristics of the site have been on-going since 2003. Surface water conditions can have impacts on the project design as well as being impacted by the project. Continued investigations will focus on the potential effects of the pits, waste rock dumps, and tailings basin on streamflow and surface water quality. Surface water investigations will include establishment and monitoring of stream gages for stream flow and continued monitoring of water quality, and additional stream monitoring located along several creeks (e.g., Merian Creek, Tomulu Creek, Las Dominicanas Creek) within the Project area within both the Commewijne and Marowijne watersheds. The study will also address the establishment of natural total suspended solids (TSS) conditions in the area.

The proposed monitoring network includes several hydrometric stations (continuous streamflow monitoring) and additional surface water quality stations currently not included in the surface water quality monitoring network. Data collected will be used to characterize the existing hydrologic regime in the creeks near the project area, specifically baseflows and flood levels, as well as to characterize impacts from current and historic small scale mining activities on the creeks. The data will allow calibration of estimates of runoff coefficients and estimates of peak and low flows. Flow data will be used to calculate contaminant loadings together with water quality data. The flow data will also contribute to developing the overall mine water balance.

Water quality sampling locations on the two major creeks downstream of the Project are included in the sampling program in order to assess potential impacts to the receiving environments. Regional streamflow analysis will be undertaken to confirm that potential impacts on the Commewijne and Marowijne under regular operating conditions will be non-detectable due to the very small percentage of these major rivers' drainage areas potentially impacted by the

Project as well as the Project's upstream location within the impacted tributaries' drainage areas. Sampling locations on the Commewijne and Marowjne will be added to the sampling program if the analysis demonstrates a potential impact from the Project. Streamflow analysis of the Commewijne will also be used to support emergency response plan as per the Cyanide Code.

The surface water quality monitoring program will be conducted seasonally in order to measure the difference in water quality between wet and dry seasons and will include laboratory analysis for a wide suite of parameters including nutrients, major ions and total and dissolved metals and will include parameters of concern including cyanide as well as field measurements such as temperature and dissolved oxygen.

#### 7.1.1.3 *Environmental Specialist Study 3: Air Quality and Climate*

An ambient air quality and climate study is needed to establish baseline air quality concentrations and climatic conditions at the Mine Site and Transport Road corridors. ERM will measure ambient air concentrations of particulate matter with diameter less than 10 microns (PM<sub>10</sub>) and total suspended particulates (TSP) as well as nitrogen dioxide (NO<sub>2</sub>) and sulfur dioxide (SO<sub>2</sub>). Monitoring stations will be established at three locations:

- near Maraba Pit, approximately 500 m from the proposed Transport Road;
- at the proposed Plant location; and
- along Moengo road.

ERM will collect data during the long dry season, which should provide a reasonable estimate of worst case conditions.

A meteorological station which includes the measurement of rainfall, temperature, barometric pressure, humidity, and wind speed and direction has been established by Surgold at the present camp site (since 2006). To establish baseline climatic conditions, ERM will analyze and summarize the hourly meteorological data collected from the station over the past 5 years. An ambient air quality report will be prepared and submitted to the client within 30 days after the end of the monitoring period and will contain the following:

1. A listing of all valid hourly meteorological data;
2. A summary of the PM<sub>10</sub> and TSP 24-hour concentrations and NO<sub>2</sub> and SO<sub>2</sub> concentrations for comparison to applicable standards, including the World Bank Air Quality Standards (WBAQS);
3. A discussion of measured exceedances of the NAAQS or WBAQS, if any;

4. A determination of the percentage of data recovered; and
5. Associated QA/QC results.

A site-specific ambient air monitoring protocol will be developed for the project.

#### 7.1.1.4 *Environmental Specialist Study 4: Noise Study*

A noise monitoring study is needed to establish baseline noise levels within the Mine Site and surrounding areas. ERM will conduct ambient noise monitoring at two locations (near Maraba Pit, approximately 500 m from the proposed Transport Road; and near the security gate (Gate 1), approximately 4 km southeast of the Plant Site) to characterize the existing noise environment. Hourly average equivalent noise levels ( $L_{Aeq}$ ) will be measured in A-weighted decibels (dBA). Noise monitoring equipment will be calibrated before and after each measurement. The equipment will be placed at approximately 1.5 m from ground level and away from buildings/structures to prevent reflection. Climatic conditions and ambient sounds observed during the measurement period will be documented. The measured ambient levels will be compared with IFC's noise standards for residential and industrial areas.

#### 7.1.1.5 *Environmental Specialist Study 5: Flora Studies*

The vegetation and flora study will produce a ground-truthed vegetation typology and map of the vegetation at the Mine Site. The approach to vegetation / flora assessment is based on the inventorying of transects (in fact long, narrow plots) in the field at representative locations, and opportunistic collecting of plants at the mine site.

The *a priori* classification of vegetation will be based on Teunissen's (1978, 1980) and Bordenave's (unpublished) vegetation typologies, and vegetation descriptions in any relevant CI RAP reports from the region. Teunissen (1978, 1980) serves as a reference for the Suriname lowlands (lowlands north of the Guiana Shield s.s.), while Bordenave (unpublished) serves as a reference for the Guiana Shield s.s. (mostly above 50-100 m altitude).

The assessment of the vegetation / flora in the field will involve:

- sampling of the "natural" vegetation along one 200 m transect per location pre-selected on the basis of the *a priori* landscape assessment (away from existing roads or tracks);
- sampling of converted habitats along one or more 50 m transects, specifically of secondary vegetation along existing roads and tracks; in principle, a converted plot will always be associated with a nearby



“natural” transect (to allow for site-specific assessments of the effect of conversion);

- targeting woody plants (trees and larger shrubs and lianas, with stem diameter > 5 cm) and plant groups with species “of concern”, i.e. species that are red-listed by IUCN or listed on CITES Appendix I or II;
- making use of the expertise of an experienced field botanist / tree-spotter for the identification of woody plants, and of a technician of the national herbarium of Suriname (BBS) for additional species recognition and, if required, the collecting of fertile voucher specimens; and
- (digital) photographic documentation of the vegetation observed and plants of which vouchers are collected.

Voucher specimens will be prepared and identified in Suriname by BBS, to the extent possible. *A posteriori*, we will evaluate the performance of BBS in terms of plant voucher identification. If required, voucher specimens can be sent to e.g. the Cayenne Herbarium (in French Guiana) for identification or confirmation, at an additional cost.

To support the field work and get a more complete listing of the flora of the area, collection data of “old” specimens in the Suriname Herbarium (BBS) will be compiled. Old specimens are those collected and identified prior to our field work; these specimens are referred to in the BBS card system.

The processing of the transect survey data will involve:

- making structure graphs – based on species identity and size data, a graph will be made that shows the individual trees and liana’s diameters on the Y axis and the height on the X axis; such graphs visualize the identity and distribution of the young and mature trees, of canopy height and of the presence and identity of very large and emergent trees;
- calculating Family Importance Values – Family Importance Value indices (FIV; see Mori et al. 1987) will be calculated, based on the transect inventory data; FIV indices are used to compare forest composition; the FIV index reflects, and is the sum of: i) relative dominance (linked to the tree size), ii) relative abundance (linked to the number of individuals), and iii) relative diversity (linked to the number of species); importance indices are calculated for each botanical family; the FIV indices reflect both qualitative and quantitative aspects of the various tree families;
- listing species - the species recorded from the transects are listed based on the Family they belong to and their Latin species name; and

- drafting of a vegetation typology – the diversity of the vegetation is presented by distinguishing, ordering and briefly describing the different vegetation types; this is based on the interpretation of the processed transect data.

The draft vegetation typology will be finalized by reconciling it, as much as possible, with existing typologies for Suriname and French Guiana. The plant list resulting from the transect inventory will be supplemented with the plants that were collected by us opportunistically (e.g. outside of the transects). The IUCN and CITES status of the plants listed will be checked and annotations will be made if species are “of concern” (e.g. endangered).

#### 7.1.1.6 *Environmental Specialist Study 6: Soil Studies*

Characterization of soil conditions is important to the prediction and mitigation of water sedimentation and erosion control during construction and operation and to provide data to support mine closure and rehabilitation. Approximately 20 soil samples will be collected from representative locations throughout the impacted area. Composite samples will be collected from a depth of 0-20 cm below ground using a hand core sampler, garden trowel, or shovel.

#### 7.1.1.7 *Environmental Specialist Study 7: Aerial Fauna Studies Birds and Bat Study*

The aim of the bird and bat study is to develop a more complete overview of the bird and bat diversity at the site, and to assess if endangered species occur there, and if so, where. The ornithological expertise of the specialist involved in this study, in combination with existing bird and bat distribution maps (e.g. Digital Distribution Maps of the Mammals / Birds of the Western Hemisphere), allow for an *a priori* assessment of the species to be expected in the study area.

Field recording of birds and bats at selected locations in the study area will be done during field trips to the Mine Site. The locations will coincide with the ones where habitats and vegetation will be assessed, though some additional locations for bird and bat observation may be needed. Observations will be made along 1-2 km long transects.

The field recording of birds and bats will involve:

- visual and aural (song) recording of birds and bats; and
- recording at the roadside and several hundred meters along a trail away from the roadside;
- opportunistic netting and collecting in case the identity of species observed is in doubt; and

- (digital) photographic documentation of birds/bats netted or collected, and if possible of some of the birds/bats observed.

The protocol for the ornithological field work will be developed along the lines of similar protocols implemented during a similar study at Bakhuis (W-Suriname). At least two bird and bat survey events (one during the wet season and one during the dry season), each approximately one-week long, will be completed. Each will involve surveying multiple locations and transects. Some additional information on bird and bat occurrence in the area will be obtained from interviews with local people (see section on large mammals, below).

The bird and bat list resulting from our inventory will be supplemented with the names of birds and bats that have been previously observed in the Mine area. The IUCN and CITES status of the species listed will be checked and annotations will be made in case species are of concern (e.g. endangered) and / or suspected to be undescribed or RRE.

#### 7.1.1.8 *Environmental Specialist Study 8: Terrestrial Fauna Studies*

##### *Amphibians and Reptiles*

The aim of the amphibian and reptile study is mainly to arrive at a more complete overview of the diversity at Mine Site, and to assess if endangered and potentially new (undescribed) or restricted range endemic (RRE) species occur there, and if so, where.

Field sampling at pre-selected locations in the study area will be undertaken during the rainy season and the dry season.

The field sampling of amphibians and reptiles will involve:

- visual and aural (song) recording of species during both night and day;
- sampling of species that require further identification in the lab;
- at each location, recording / sampling along a trail of ca. 1-1.5 km in length; and
- (digital) photographic documentation of amphibian and reptile species observed (if possible) and certainly of those collected.

The protocol for the herpetological field work will be based on past successful surveys completed at various locations in Suriname by the specialist involved in this study.

Some additional information on Amphibia and reptile occurrence will be obtained from interviews with local people (see section on large mammals, below).

The Amphibia and reptile list resulting from our inventory will be supplemented with the names of Amphibia and reptiles that have been previously observed in the Project area. The IUCN and CITES status of the species listed will be checked and annotations will be made in case species are of concern (e.g. endangered) and /or suspected to be undescribed or RRE.

### *Large Mammals and Marsupials*

The aim of the large mammals and marsupials study will mainly be to arrive at a more complete overview of the large mammal and marsupial diversity at the Mine Site, and to assess if endangered species occur there, and if so, where. Large mammals can be operationally defined as those weighing more than 1 kg (on average).

To predict the presence of large mammals and marsupials in the Project area, existing distribution maps will be used (e.g. Digital Distribution Maps of the Mammals and marsupials of the Western Hemisphere). Pre-existing information on the mammals and marsupials actually observed at the Mine Site are available through the motion sensor camera studies that have been conducted since 2009 at the project. Trapping of mammals and marsupials is not an option, nor is the extensive recording of larger mammals and marsupials along trails, although we will develop and implement a protocol for the opportunistic recording of mammals and marsupials by our entire field team members.

Comprehensive information on mammal and marsupial occurrence will be obtained by interviewing local people that live, work and / or hunt in the general area. We intend to interview Maroons who live in villages and camps in the lowlands, and possibly also Brazilians that are involved in mining activities in the lowlands. These interviews will focus on game species and species collected for the wildlife trade, which are usually the best known locally, as well as the most valuable and often also the most endangered species. During the interviews, feedback will be requested on a list of some 90 animal species that may occur in the larger area, mostly large mammals and marsupials. Each species on the list will be mentioned to the informant by its local name, described in the Dutch or Surinamese language if required, and illustrated by showing color drawings if there is any remaining doubt.

We will compile a list of all large mammals and marsupials that have been recorded previously in the Project Area, that have been recorded by our team,

and that were confirmed by local inhabitants. The IUCN and CITES status of the species listed will be checked and annotations will be made in case species are “of concern” (e.g. endangered).

### *Insects*

The aim of the insects study will mainly be to arrive at a more complete overview of the diversity at Mine Site, and to assess if endangered and potentially new (undescribed) or restricted range endemic (RRE) species occur there, and if so, where. Most insects can easily be recognized to order, such as Hymenoptera (bees, wasps, and ants) or Coleoptera (beetles). However, insects other than Lepidoptera (butterflies and moths) are typically identifiable to genus or species only through the use of identification keys and monographs.

Field sampling at pre-selected locations in the study area will be undertaken during the rainy season and the dry season.

The protocol for the entomological field work will be similar to past successful surveys applied at various locations in Suriname by the specialist involved in this study.

Some additional information on insect occurrence will be obtained from interviews with local people (see section on large mammals, above).

The insect list resulting from our inventory will be supplemented with the names of insects that have been previously observed in the Project area. The IUCN and CITES status of the species listed will be checked and annotations will be made in case species are of concern (e.g. endangered) and / or suspected to be undescribed or RRE.

#### 7.1.1.9

#### *Environmental Specialist Study 9: Fish and Aquatic Habitat Baseline Studies*

This study will characterize the fish and aquatic community of potentially affected streams in and near the Mine Site. The field study for the ESIA will not sample every stream at the Mine Site, but will include several streams from each major watersheds and the full range of aquatic habitat conditions (velocity, water quality, substrate conditions, vegetated vs. non-vegetated, etc.) present in the streams. We will conduct a wet season and a dry season survey using nets and/or electroshock techniques.

The fish will be identified and any rare or endemic fish, as well as fish used as a subsistence food source noted. We will conduct fish tissue analysis to document baseline metal concentrations, especially for key metals expected in the seepage

from the waste rock dumps and tailings basin. This data will be combined with past surveys completed at the site, including fish tissue analyses for metals.

## 7.1.2 *Socio-Economic and Human Health Specialist Studies*

The social baseline studies include three interrelated aspects:

- socio-economics
- community health
- living cultural heritage both tangible and intangible

### 7.1.2.1 *Socio-Economic Study 1: Social Baseline Studies*

A team of specialists along with local sub consultants will undertake the baseline studies. Based on our prior knowledge and previous work with Surgold our key study area for this component will include the ten Pamaka villages, namely:

- Akaati
- Atemsa
- Bada Tabiki
- Kiki Mofo
- Langatabiki
- Loka Loka
- Nason
- Pakira Tabiki
- Skin Tabiki
- Tabiki Ede

In addition to the above, there could be communities potentially affected by the transport corridor mainly due to movement of trucks and vehicles from the port to the site. Based on the outcomes of a traffic assessment study certain communities may be included in the baseline studies such as the communities of Pilgrim Kondre, Mora Kondre, Abadu Kondre etc.

In addition, dependent upon the results of a scoping assessment of Tempatie Kreek and the Commeweyne River as well as some hydrological modeling, it will be assessed whether any villages in this area should be included such as the Ndjuka communities of Java, Penica, Mapane, Moengotapu, Awara, Potehede, Stronkampu, Grankop and Moisimoisi.

As appropriate, the project team will undertake a combination of qualitative interviews and quantitative surveys of local communities/households, local decision makers/community leaders, potentially marginalized groups, local NGOs, government authorities. This will be supplemented by focus group

meetings to determine concerns and expectations in relation to Surgold's activities in the area.

Data collection use the following series of techniques:

- Household surveys
- Interviews and group discussions
- Infrastructure mapping
- Health studies

The social team will also use participatory rural appraisal (PRA) techniques such as resource mapping and focus group discussions during community interviews.

The purpose of the socio-economic study is to establish a detailed understanding of the characteristics of the communities within the geographic scope of work.

The socio-economic baseline will have the following type of indicative content:

- Demographic profile (age, gender, family structure etc);
- Housing conditions and distribution of settlements;
- Occupational profile, including employment and livelihood status (job – if applicable, sources of income, livelihood strategies);
- Income profile;
- Education (all levels, including vocational training);
- Religion;
- Race and ethnicity (including indigenous populations, languages);
- Land use and ownership;
- Access to public services and utilities (electricity, sanitation, water, health services, information and communication technology);
- Sources and use of energy;
- Study of resource-based livelihoods concentrating on the use of land and resources – especially through cassava cultivation, hunting and fishing -- for subsistence and income generation;
- Study of community usage of area in and around the mine site with specific focus on hunting and traditional transport/access corridors;
- Study of land use (planning controls, access to land, land rights, history of land use patterns – when areas under cultivation came into cultivation, when specific land tilled);

- Study of water use;
- Vulnerable people's assessment; and
- Living cultural heritage and community usage of sacred sites e.g. forests

#### 7.1.2.2 *Socio-Economic Specialist Study 2: Health Baseline Studies*

The implementation of the Health Study will be undertaken by ERM's Public Health lead and/or epidemiology professionals including experts from universities or NGOs. Key health issues for further study may include malaria transmission; mercury poisoning; health infrastructure capacity and access; and indigenous health practices. Depending on the information gathered during the Scoping Task and a determination of what is relevant to the ESIA, this may include:

- Vector-related disease
  - o Incidence and prevalence of malaria, typhus and dengue
- Sexually transmitted infections
  - o Prevalence of prostitution
  - o Incidence and prevalence of HIV/AIDS and other sexually transmitted infections (STIs)
- Consumption and nutrition-related issues
  - o Changes in subsistence practices
  - o Rates of malnutrition
  - o Incidence of alcohol and drug abuse
- Accidents and Injuries
  - o Traffic and road related incidents/deaths
  - o Construction accidents/deaths
- Exposure to potentially hazardous materials
  - o Respiratory complications from air /dust pollution
  - o Consumption of contaminated water sources (including mercury)
- Cultural health practices
  - o Role of traditional medical providers, indigenous medicines or unique cultural health practices
- Health systems infrastructure and capacity
  - o Physical infrastructure



- o Staffing and technical capabilities of health care facilities at local, district and provincial levels
- Access to health services
  - o Prevalence of vaccinations/immunizations by local population
  - o Access to primary and tertiary health services by the local population

### 7.1.2.3 *Socio-Economic Specialist Study 3: Cultural Heritage Study*

The resources of interest for the cultural heritage study include pre-colonial archaeological remains potentially dating from the late Pleistocene up until the start of the colonial period in the 16th century. The study will also include colonial period and modern remains up to the mid twentieth century. Resources of interest to the scientific community as well as local stakeholders will be considered. The study will include potential archeological sites, historic buildings, marked and unmarked human burials and sites of special religious or spiritual importance.

A specialist team consisting of a senior and mid-level cultural heritage expert will implement a methodology to include:

- Desk study;
- Consultation with local and international experts;
- Field reconnaissance; and,
- Archeological sensitivity and sources on the archaeology and history of Suriname, including the comprehensive archaeological site list in National Museum.

The team will refer available literature will develop a draft cultural heritage sensitivity map of the region surrounding the project area. The map will indicate precise locations of know resources and areas most likely to contain undiscovered resources. A draft version of the map will guide and focus the field reconnaissance, indicating areas that are to receive special attention. The sensitivity map will be refined based on the field work and will be used subsequently to identify potential impacts and to guide and focus mitigation efforts.

## 7.1.3 *Other Desktop Studies to inform the ESIA*

### 7.1.3.1 *Desktop Study 1: Geology*

No further geologic field studies are proposed to the ones that have already been completed for the project, but the ESIA will draw on the exploration work and

geologic characterization and mapping that have already been completed by Surgold. This information will be summarized in the ESIA.

#### 7.1.3.2 *Desktop Study 2: Geochemistry*

Surgold has already conducted a comprehensive assessment of the mine geochemistry, including the potential for acid rock drainage (ARD) and the likely water quality constituents of seepage from the waste rock dump and tailings basin. No additional geochemical studies are proposed for the ESIA, but the available information will be used as inputs for water quality modeling. Mine geochemistry and predicted surface and groundwater quality during operations and closure will be discussed in the ESIA.

#### 7.1.3.3 *Desktop Study 3: Ground and Air Vibration Assessments associated with Mine Blasting*

To determine the ground vibration and air vibration (airblast overpressures) effects of mine blasting at existing gold mines within the Surgold concession, ERM will perform baseline ground and air vibration calculations using desktop models. The computations would be based on information provided by Surgold regarding explosives required for blasting (explosive type, charge mass per hole), blast-hole diameter, and burden or stemming height. Since the proposed Project would also include mine blasting, ERM will also use desktop models to compute and assess the project-related ground and air vibration effects of mine blasting at the proposed gold mine. The ground vibration levels (peak particle velocity) and air vibration (Linear decibels) levels will be compared with applicable international standards such as the New Zealand Environment and Conservation Council (ANZECC) guidelines – *Technical Basis for Guidelines to Minimize Annoyance due to Blasting Overpressure and Ground Vibration, dated 1990*. The Mine Engineer will be responsible for ensuring mine features (e.g., tailings dam, worker village) are appropriately designed to withstand project-related vibration.

#### 7.1.3.4 *Desktop Study 4: Natural Hazard Studies*

The ESIA will address the potential for natural hazards affecting the project area. These natural hazards include flooding, hurricanes, seismic events, and induced geo-technical issues. The potential for flooding will be assessed semi-quantitatively by determining recurrence intervals for large storm events based on the available meteorological data. Since the project straddles a ridge line, we do not believe flooding is a real concern, but large storm events can affect overall mine water management therefore ERM will coordinate with the mine engineer to ensure large-storm water management is included in the mine design. Suriname is a low hazard area in terms of hurricanes and seismic events. These

issues as they relate to the project will be analyzed based on literature probability values.

Large rainfall and other events can create geo-technical issues, especially with the tailings dam and other engineered structures. Although the design engineer will be responsible for ensuring adequate mine design, the ESIA will address the potential for geo-technical issues (e.g., tailings dam failure, slope slumping). The ESIA would ensure that contingency plans are in place for the tailings dams, in the unlikely event of a dam failure. The ESIA will include an annex that explains the contingency plans for dam construction.

#### 7.1.3.5 *Desktop Study 5: Visual Impacts Study*

The project is in a remote area that is approximately 20 km from the nearest road or residence. It is surrounded by tall forest. Therefore, we believe the project's potential for visual impacts is minimal. A desktop assessment of the potential for visual impacts will be conducted, including identification of any potential sensitive viewpoints (e.g., potential for waste rock dumps to be visible from any off-site locations) and to generally characterize these visual effects. This visual assessment will also address the visual appearance of the mine site at closure.

#### 7.1.3.6 *Desktop Study 6: Carbon Footprint Study*

The conduct a carbon footprint of the existing study area will be established using the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. The study will evaluate the value of undisturbed native forest by accounting for the existing carbon stock (sequestered carbon) in each vegetation type (both above ground and below ground biomass) within the study area and determine the carbon loss in the form of carbon dioxide that would result from deforestation activities at the mine site. The study will also account for carbon losses to the atmosphere from anthropogenic sources during project construction and operations (e.g., burning of fossil fuels from mine equipment and vehicles and power plant).

## 7.2 **IMPACT ASSESSMENT METHODOLOGY**

Information on potential impacts, including potential cumulative effects generated from the activities required to construct and operate the Merian Project and will be obtained from various sources, including consultation with Surgold and local sources; discussions with the NIMOS and other Surinamese agencies; EIAs for similar projects worldwide; and literature and research.

To identify and assess potential impacts associated with or resulting from project activities, the project team will use professional judgment, fieldwork, and desk-top analysis to identify potential impacts and their interactions. In addition to evaluating specific resource areas such as vegetation and water quality, the project team will evaluate unavoidable consequences, effects to water quality, vegetation, and biodiversity. The significance of potential impacts that may result for the Proposed Project will be determined to assist NIMOS in preparing recommendations for evaluation of the Proposed Project.

The methodology that will be used to identify and assess the potential impacts of the Proposed Project is described in the following sections.

### 7.2.1 *Steps of Impact Assessment*

Impact Assessment takes place as follows:

1. Characterize the baseline – the existing conditions before the Project is undertaken and any effects are generated;
2. Identify sources of impacts and the impacts themselves that are generated by any aspect of the Project;
3. Rate impacts before any mitigation (for negative impacts) or enhancement (for positive impacts) is implemented;
4. Suggest mitigation and enhancement measures to address the impact; and
5. Rate impacts after mitigation to produce a “residual” impact rating.

### 7.2.2 *Why a System for Rating Impacts?*

It is standard practice in ESIA processes to “rate” potential impacts:

- To provide a basis for prioritization of impacts to be dealt with;
- To provide a method of assessing the effectiveness of proposed mitigation measures; and
- To provide a scale which shows the level of impact both before and after a proposed mitigation measure has been applied.

For the ESIA, a consistent system for rating impacts in order to apply analytical rigor to the assessment and rating process will be used. It must be remembered, however, that any outcome with regard to reducing major negative impacts or enhancing positive impacts is dependent on the selection, applicability, implementation and effectiveness of mitigation measures for the Proposed Project.

### 7.2.3 *Criteria for Rating Impacts*

An impact rating is the product of two elements: (1) the severity of the potential impact and (2) the likelihood of the “event” occurring.

#### 7.2.3.1 *Severity and Enhancement Criteria*

The severity or enhancement of each impact will be rated using the criteria identified in Tables 7-1, 7-2, 7-3, and 7-4. Note that colors are used to assist the reader in reviewing the impacts and their relative magnitude. As such, they should not be considered definitive.

**Table 7-1. *Severity Criteria (Negative Environmental Impacts)***

Duration		
<i>Low</i>	Short-term (up to one year)	Affects environmental conditions, species, and habitats over a short period of time, is localized and reversible.
	Low frequency	
<i>Medium</i>	Medium-term (one to seven years)	Affects environmental conditions, species and habitats in the short to medium term. Ecosystems integrity will not be adversely affected in the long term, but the effect is likely to be significant in the short or medium term to some species or receptors. The area/region may be able to recover through natural regeneration and restoration.
	Medium or intermittent frequency	
<i>High</i>	Long-term (more than seven years)/ Irreversible	Affects environmental conditions, species and habitats for the long term, may substantially alter the local and regional ecosystem and natural resources, and may affect sustainability. Regeneration to its former state would not occur without intervention.
	Constant frequency	Affects environmental conditions or media over the long term, has local and regional affects and/or is irreversible.

**Table 7-2. Severity Criteria (Negative Social or Health Impacts)**

	<i>Duration</i>	<i>Extent</i>	<i>Ability to Adapt</i>	<i>Socio-cultural Outcome</i>	<i>Health Outcome</i>
<b>Low</b>	Short-term (up to one year)  Low frequency	Individual/ Household	Those affected will be able to adapt to the changes with relative ease, and maintain pre-impact livelihoods, culture, quality of life and health.	Inconvenience but with no consequence on long-term livelihoods, culture, quality of life, resources, infrastructure and services.	Event resulting in annoyance, minor injury or illness that does not require hospitalization
<b>Medium</b>	Medium-term (one to seven years)  Medium or intermittent frequency	Small number of households	Those affected will be able to adapt to change, with some difficulty, and maintain pre-impact livelihoods, culture, quality of life and health but only with a degree of support	Primary and secondary impacts on livelihoods, culture, quality of life, resources, infrastructure and services	Event resulting in moderate injuries or illness, which many require hospitalization
<b>High</b>	Long-term (more than seven years)/ Irreversible  Constant frequency	Large part of/ full settlement	Those affected will not be able to adapt to changes and continue to maintain pre-impact livelihood	Widespread and diverse primary and secondary impacts likely to be impossible to reverse or compensate for.	Catastrophic event resulting in loss of life, severe injuries or chronic illness requiring hospitalization.

**Table 7-3. Enhancement Criteria (Positive Environmental Effects)**

	<i>Duration</i>	<i>Extent</i>	<i>Degree of Change</i>	<i>Focus/ Sensitivity</i>
<b><i>High level of enhancement</i></b>	Benefits will be sustained over the long term.	Benefits will extend beyond local environment (i.e., linkage of fragmented habitat, e.g., regional corridor)	Direct benefits to species or resources will provide significant opportunities for sustainability.	Benefits will pertain to species, habitats and natural resources that are degraded, or are sensitive, rare, or in need of protection..
<b><i>Medium level of enhancement</i></b>	Benefits will be measurable in the short term and possibly longer.	Benefits to many species, habitats and natural resources in the local environment and beyond.	Moderate benefits to species, habitat, and natural resources that may provide some opportunities for sustainability.	Benefits will pertain to species, habitats and natural resources that have some level of degradation, sensitivity, or rarity.
<b><i>Low level of enhancement</i></b>	Benefits will be short term.	Benefits to a few species, associated habitat, and resources in the local environment only.	Minor benefits to species, habitat, and natural resources that may provide minor opportunities for sustainability.	Benefits will pertain to species, habitats and natural resources that are not sensitive or rare.

**Table 7-4. Enhancement Criteria (Positive Social and Health Impacts)**

	<i>Duration</i>	<i>Extent</i>	<i>Degree of Change</i>	<i>Focus/Sensitivity</i>
<i>High level of enhancement</i>	Benefits will be lasting and sustained over the long term i.e.: more than 7 years	Benefits throughout the local community and beyond to State/ National level.	Direct benefits to individuals and communities will provide significant opportunities for leveraging secondary benefits and significantly improving livelihoods for themselves and others	Benefits will pertain to vulnerable groups and those that would have otherwise been 'losers' as a result of the project.
<i>Medium level of enhancement</i>	Benefits will be felt for a medium period of time (1 to 7 years) or be intermittent over the longer term	Benefits to many individuals and households in the local community and beyond	Moderate benefits to individuals and communities which will provide some opportunities for furthering themselves and improving livelihoods	Benefits will possibly pertain to vulnerable groups and those that might have been 'losers' from the project
<i>Low level of enhancement</i>	Benefits will be short-term (up to a year)	Benefits to a few individuals and households either in the local area and/or further afield.	Some benefits to individuals and communities, potentially improving opportunities for furthering themselves and improving livelihoods	Benefits will not pertain to vulnerable groups and will only benefit those that would have otherwise benefited from the project.

7.2.3.2 *Likelihood Criteria*

Likelihood of the event occurring is comprised of the following categories:

- Low likelihood - Rare (e.g., few or no occurrences in Project-related mining industry);
- Medium likelihood - Uncommon (e.g., documented occurrences in Project-related mining industry); and
- High likelihood - Common (e.g., occurs within the mining industry).

7.2.4 *Determining the Rating*

The overall rating of the impacts will be determined by using the following matrix (Table 7-5). It should be noted that these matrices act as a guide and there may be situations where their rigid application is inappropriate and where stakeholder perceptions and feedback have a significant role to play. For specific impacts where this is the case, the rating is clearly explained in the evaluation of the impact.



**Table 7-5. Rating Matrix**

	<i>Likelihood</i>		
<i>Severity/ Enhancement</i>	<i>Low</i>	<i>Medium</i>	<i>High</i>
<i>High level of enhancement</i>	Moderate	Major	Major
<i>Medium level of enhancement</i>	Minor	Moderate	Major
<i>Low level of enhancement</i>	Insignificant	Minor	Moderate
<i>Low severity</i>	Insignificant	Minor	Moderate
<i>Medium severity</i>	Minor	Moderate	Major
<i>High severity</i>	Moderate	Major	Major

### 7.3 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The key output of an ESIA is the environmental and social management plan (ESMP). The ESMP is an adaptive management system that should be designed to assure that the mitigation measures proposed in the ESIA are effectively implemented during the life of the project and continually refined and modified as necessary on the basis of actual field conditions and circumstances which may not have been anticipated at the time of ESIA preparation. The ESMP will include a Mine Closure and Rehabilitation Plan.

As a management system (e.g., ISO 14001), the ESMP should have the following components at a minimum:

- An organizational hierarchy which assures day to day oversight and implementation of the ESMP with the identification of a senior corporate official who has ultimate responsibility for the implementation of the system;
- A clear statement of goals and a schedule of actions to be implemented including the specific impact mitigation measures identified in the ESIA;
- Clear responsibilities for implementation of each mitigation measure with a clear chain of command for oversight;
- A budget for implementation including a budget for likely contingencies and a mechanism for budget replenishment in the event of unexpected events or circumstances (e.g., force majeure events);
- A contracting management system to assure that all contractors and subcontractors are informed and aware of the ESMP and a contracting mechanism which will incentivize contractors and their subcontractors to

comply with the ESMP or alternatively penalize them for failure to comply with the ESMP; and

- An ongoing monitoring and reporting program, with specified reporting intervals, for the life of the project including real time management oversight and auditing (ideally by a third party) to ascertain that the impacts are occurring as predicted and the mitigation measures are effective. The ESMP should also include a mechanism to continually revise and implement necessary corrective actions to assure that impacts are avoided where possible and when not avoidable are mitigated effectively.

ERM anticipates that Surgold would apply their corporate Environmental Health Statement (EHS) management system, which has most of these same elements imbedded in it, to the project for its expected life. Hence, the logical way to proceed would be to develop an ESMP in close collaboration with the Surgold project management team that is harmonized with the corporate and project based EHS management system.

## 8.0

**PROJECT SCHEDULE**

Table 8-1 summarizes the schedule for implementing the ESIA for the Merian Project. The ESIA schedule is subject to change based on project needs and development schedule.

**Table 8-1. Merian Project ESIA Implementation Schedule**

<b>Date</b>	<b>ESIA Process/Activity</b>
June - July, 2011	Initial agency meetings
August, 2011	Draft ToR
August, 2011	ToR consultations and public meeting
August 2011-February 2012	Baseline Studies
February -March, 2012	Impact Assessment Studies
March 2012	Draft ESIA public meeting to disclose findings
April 2012	Distribute Draft ESIA
June 2012	Final ESIA

- Buursink. 2005. Country Environment Assessment (CEA) – Suriname. Draft Report, February 2005. Inter American Development Bank.
- National Institute for Environment and Development in Suriname (NIMOS). 2009. Environmental Assessment Guidelines, Volume I: Generic, Second Edition: August 2009, Office of Environmental and Social Assessment.
- National Institute for Environment and Development in Suriname (NIMOS). 2005a. Environmental Assessment Guidelines, Volume I: Generic, Office of Environmental and Social Assessment.
- National Institute for Environment and Development in Suriname (NIMOS). 2005b. Environmental Assessment Guidelines, Volume IV: Social Impact Assessment, Office of Environmental and Social Assessment.
- SRK Consulting. 2007. Environmental and Social Impact Assessment of Transport Aspects of the Proposed Bakhuis Bauzite Project, Report No 362387/2a.

Annex A

## ESIA Team Curriculum Vitas



# David W. Blaha, AICP

Project Director - Hydropower Specialist



Mr. David Blaha is a Partner with ERM based in Washington D.C. Mr. Blaha has 29 years of experience in environmental and social impact assessment, natural and cultural resource management, sustainable development, stakeholder consultation, and strategic advice for review or permitting of primarily large (>\$US 1B) mining, infrastructure, and oil & gas projects.

Mr. Blaha is thoroughly familiar with both U.S. regulatory and procedural requirements (e.g., NEPA and CEQ guidance) and international EIA best practice (e.g., IFC Performance Standards, EBRD Performance Requirements, and Equator Principles). In addition to preparing Environmental and Social Impact Assessments, Management Plans, and Action Plans in accordance with international best practice, Mr. Blaha has worked with many Equator Banks, bilateral and multilateral financial institutions, and other lenders to conduct appropriate environmental and social due diligence, gap analysis, and construction/operation compliance monitoring relative to the IFC Performance standards, Equator Principles, and other lender policy/requirements.

He has extensive experience addressing biodiversity, indigenous peoples, wetlands, and water resource issues. Special expertise in evaluating mining and metals, power, land use, military, water resource, and transportation projects.

For mining, Mr. Blaha has significant experience in evaluating a wide range of groundwater and surface water issues associated with mining, including evaluating groundwater drawdown from pit dewatering (and potential indirect effects on wetlands), potential for acid rock drainage from waste rock dumps and tailings basins, overburden management, hydrometallurgical

residue management, and impacts to downstream fisheries and aquatic habitat.

## Professional Affiliations & Registrations

- American Institute of Certified Planners, 1986
- International Association of Impact Assessors
- American Water Resources Association
- National Association of Environmental Professionals

## Fields of Competence

- Sustainability planning including stakeholder engagement and development of sustainability indicators, metrics, and monitoring programs.
- Environmental and social impact assessment for a wide variety of projects including mining, metal refining, and smelting; reservoirs, marinas, power generation and transmission, LNG import terminals, gas pipelines, highways, transit, housing, parks, military facilities and industrial development projects.
- Public participation including the development of innovative, collaborative stakeholder engagement programs and consensus-based public participation processes.
- Regional environmental planning including river basin studies, forest management plans, wildlife corridors, and natural resource management plans for parks and preserves.

## Education

- Master of Environmental Management, Duke University, 1981
- Bachelor of Arts, Biology, Gettysburg College, 1978

## Key Industry Sectors

- Mining
- Power
- Financial
- Government

## Key Projects

### **Suralco Alumina Refinery Expansion ESIA, Suriname.**

Served as Project Director for the development of an ESIA evaluating the environmental and social effects of proposed alumina refinery modifications required to accommodate a new bauxite source, as well as expansion of the bauxite residue disposal areas. Includes stakeholder engagement, social baseline surveys, and development of E&S Management Plans. Project complied with NIMOS guidelines.

### **Nassau Plateau Bauxite Mine ESIA, Suriname.**

Serving as Project Director for baseline studies and preparation of an ESIA for a bauxite mine to meet both Suriname (NIMOS) and international standards for Alcoa. Key issues include effects on endangered fish, habitat fragmentation, and water quality. Coordinating stakeholder engagement with local Maroon and Amerindian communities.

### **Newmont Meridian Gold Mine Social Strategy, Suriname.**

Project Director for developing social strategy for proposed gold mine in eastern Suriname in preparation for mineral agreement negotiations with government.

### **Wageningen Sugarcane/Bioethanol ESIA, Suriname**

Project Director for preparing ESIA to meet international standards and NIMOS guidelines for sugarcane to bioethanol facility in western Suriname for Staatsolie.

**Maniitsoq Aluminium Smelter/Hydropower Project ESIA, Greenland.** Project Director for development of ESHIA for an integrated hydropower, transmission line, aluminum smelter, and port complex in southwest Greenland. Coordinating with Greenland Home Rule Government on a Strategic Environmental Assessment, overseeing baseline environmental and social studies, managing stakeholder engagement program, and integrating a sustainability initiative into the ESHIA process.

### **Oyu Tolgoi Copper Mine IESC, Mongolia**

Project Director serving as Independent Environmental and Social Consultant for the lenders (IFC, EBRD, EDC, Standard Chartered, BNP Paribas) for the world's largest undeveloped copper-gold project located in the Gobi Desert. Project involves both open pit and underground mining using block caving method with an initial capacity of 110,000 tons per day of ore, which will increase to at least 158,000 tpd. Copper concentrate to be exported by truck. Key issues include Potentially Acid

Generating waste rock and tailings, water use and availability, impacts to vulnerable herder families and effects on several globally endangered mega-fauna. Evaluating ESIA, ESMP, and ESAP in terms of IFC PS, Equator Principles and EBRD Environmental Requirements. Responsible for helping lenders manage financial and reputational risks for largest mine financing project in history (US\$3B project).

### **NorthMet Mine EIS, U.S.**

Served as water resource lead, overall EIS technical coordinator, and strategic advisor for development of an EIS for an open pit 32,000 tpd polymetal sulfide mine in Minnesota as Third-party Contractor for the US Army Corps of Engineers, US Forest Service, and MN Department of Natural Resources, with the active involvement of USEPA and US Fish and Wildlife Service. Project involves subaqueous disposal of reactive waste rock and reuse of a brownfield taconite tailings basin. Oversaw development of comprehensive EIS including rigorous alternatives and cumulative effects analyses.

### **Inter-American Development Bank (IDB) Support Services Contract.**

Project Director for two multi-year task order contracts with the IDB (one for private sector financing and one for public sector projects) providing environmental and social impact review and assessment for a variety of projects including: geothermal power plant in Bolivia, an electric transmission line in Ecuador, and a highway in Ecuador.

### **Nkamouna Mine ESDD, Cameroon.**

Senior Technical Advisor for an Environmental and Social Due Diligence/Equator Principles review for a proposed cobalt-nickel-manganese mine in Cameroon on behalf of the lenders (Standard Chartered among others). Key issues addressed include biodiversity and effects on indigenous peoples (i.e., the Baka, a pygmy tribe).

### **Global Alumina (GAC) Bauxite Mine and Alumina Refinery Project, Guinea.**

Project Director providing Equator Principle Review and Lender Advice for Global Alumina Project (GAC) in Guinea. Conducted an Environmental and Social Due Diligence and provided investment advice to a consortium of 17 lenders including IFC on the feasibility of lending and potential environmental & social risks. The GAC project includes the development of a mine, port and alumina refinery in Sangaredi and Kamsar areas of Guinea. Assessed the adequacy of the Resettlement Action Plan and subsequent resettlement activities as

well as advised on Biodiversity Action Plan to ensure that the chimpanzees in the mine area are protected. For a period of two years ERM specialists reviewed the project activities, advised the lender consortium and provided technical assistance.

**Land Use Compatibility Study, Canada.**

Technical advisor for evaluation of potential noise and vibration effects from an existing mine on a proposed hospital and college site on behalf of the Iron Ore Company of Canada.

**Newmont Meridian Gold Mine Social Strategy, Suriname.**

Project Director for developing social strategy for proposed gold mine in eastern Suriname in preparation for mineral agreement negotiations with government.

**Cerrejon Coal Mine, Colombia.**

Serving as Project Director for an independent evaluation of a proposed expansion of the world's largest open pit bituminous coal mine in the world. Addressing effects on environment, neighboring villages, and downstream indigenous lands.

**Suralco Alumina Refinery Expansion ESIA, Suriname.**

Serving as Project Director for the development of an ESIA evaluating the environmental and social effects of proposed alumina refinery modifications required to accommodate a new bauxite source, as well as expansion of the bauxite residue disposal areas. Includes stakeholder engagement, social baseline surveys, and development of E&S Management Plans.

**Alcoa-Alcan Alumina Refinery Project, Guinea.**

Project Director for several components of a proposed alumina refinery near Boke in Guinea. Coordinate the preparation of a Health Impact Assessment for the project and also directed a Worker Camp Siting Workshop for the project proponents.

**Beni Saf Aluminium Smelter, Algeria.**

Technical Advisor for ESHIA for 1.2 Mtpa aluminum smelter in Algeria for Dubal. Provided advice regarding air emissions, spent pot liner disposal technology, and issues regarding desalination plant.

**East Iceland Sustainability Initiative.**

Project Director for project assessing the sustainability of a controversial hydropower and aluminum smelter project in a rural area of Iceland. Assisting Alcoa in the development of an overall corporate sustainability

framework, as well as specific environmental, social, and economic indicators and metrics.

**Chatham Smelter ESHIA, Trinidad.**

Project Director for development of ESHIA for 341,000 metric tons per annum aluminum smelter for Alcoa in southwest Trinidad. Coordinated social baseline studies addressing livelihoods and resettlement concerns, developed successful stakeholder engagement strategy and community meetings for very controversial project, and initiated preparation of ESHIA before Alcoa decided to withdraw the project.

**Massena Aluminum Smelter Modification, USA**

Project Director for conversion of older smelter from Soderberg to pre-bake technology, including improvements in air emissions, SPL generation, and wastewater discharges.

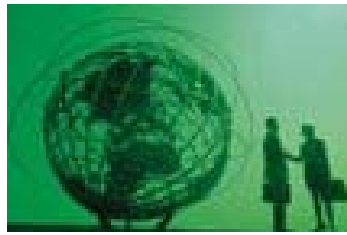
**Jamalco Port Reconstruction Review, Jamaica.**

Project Director for an environmental review of alternatives for reconstructing the Jamalco port facilities that were destroyed in Hurricane Dean for Alcoa. Evaluated effects of trestle and causeway designs on benthic habitat, sediment transport, and fish in support of an application to the Jamaica National Environment & Planning Agency.



# Sunrita Sarkar

Senior Consultant



Sunrita Sarkar is a Sociologist and is based in ERM's Washington DC office. She is a Senior Project Manager at ERM and her responsibilities include project planning, management of teams and execution of projects related to environment social and health impact assessments, resettlement & rehabilitation, social audits, social risks, community participation, stakeholder management and natural resources.

She has more than 12 years experience of working on social impact assessments, social audits/due diligence, indigenous people's issues and resettlement & rehabilitation issues of a number of development projects in mining & oil & gas, forestry, manufacturing sector, power, dams, roads and highways. She has extensive experience in stakeholder and community management.

She has worked extensively on projects funded by donor agencies such as the IFC, World Bank, and the Asian Development Bank.

Sunrita is a certified SA 8000 Lead auditor and has extensive experience of labor (ILO codes) and human rights issues. She has conducted several labor rights, equality and workplace audits of manufacturing plants, mines and corporations.

She has conducted several Equator Principle reviews using Performance Standards for project finance on behalf of equator banks and also for IFC. Sunrita co-manages a contract on behalf of ERM with the General Manufacturing Services (that includes Agro-business and Forestry sector) in IFC. Her responsibilities include advising the IFC on proposed investments, coordinating environmental and social auditors for the due diligence team and QA/QC of the reports coming out of the contracts. As a part of the contract, Sunrita has managed projects in Brazil and India and advised IFC on the proposed lending.

Sunrita has extensive hydropower experience and has worked on projects in Asia, Africa and LAC. She recently led the workshop on behalf of World Bank and International Hydropower Association (IHA) on the formulation of the Hydropower Sustainability Assessment Protocol.

Sunrita has delivered several trainings to private sector clients such as Freeport, Alcoa and Guyana Goldfields on IFC PS and Equator principles. In addition she has facilitated several policy workshops for lending institutions like the World Bank.

She has authored several policy documents and handbooks for the World Bank group such as *Community Development and Local Conflict in Extractive projects*, *Community Development Agreements (CDAs) in the Extractive Sector* and *the IFC Social Investment Handbook*.

She has worked in Asia, Caribbean, Mediterranean, Africa and Latin America.

## Fields of Competence

- Social Impact Assessments and mitigation
- Resettlement and Rehabilitation
- IFC Performance Standards/ Equator Principles Review (of ESIA and ESMP including RAP Review)
- Social Management Plans
- Public Consultation and Disclosure Plans
- Community Relations and Stakeholder Engagement
- Social / Community Investment Strategy
- Monitoring and Evaluation
- M&A (Phase I ESA audits & compliance review, environmental risk & due diligence)
- Environmental & social regulatory review
- Social/Labour Audits
- Policy studies

## Education

- Masters in Sociology from Jawahar Lal Nehru University, 1997-99
- B.A. (Hons) in History From Delhi University, 1994-97

## Certification

SA 8000, Lead Auditor

## Languages

- English
- Hindi
- Bengali

## Key Projects

**ESIA of Suralco's proposed mining exploration in the Nassau plateaus in Suriname.** ERM has been commissioned by Alcoa (Suralco) to conduct a detailed ESIA and feasibility analysis of the proposed bauxite mining activities in the Nassau area. The project involves mining in the Nassau concession as well as a transport road connecting the proposed mine to the refinery at Paranam. Sunrita is the lead social specialist who is heading a team that is conducting surveys, assessments & stakeholder consultations in the Maroon villages in the Nassau area as well as all the habitations that fall in the proposed transport corridor.

**ESIA of Suralco's (Alcoa) DRDA 2 and 3 in Suriname.** Suralco (Alcoa local company) in Suriname is making changes to their residual disposal areas for red mud disposal. These changes necessitate the building of two residual disposal areas adjacent to Alcoa's refinery plant. Suralco commissioned ERM to conduct an ESIA of the project. Sunrita was the lead social specialist who carried out the social impact assessment and stakeholder consultation for the project. She has facilitated a household survey, stakeholder consultations and organized public meetings with the communities as the lead social specialist.

**Surgold Social Strategies and Capacity building Assistance for the Merian project Suriname.** Sunrita is the project manager and is advising Surgold (Newmont) on its community relations strategy and development plan going forward in the Merian project. This involves training the community relations staff and consultations with the communities.

**Preparation of Resettlement Action Plan (RAP) for a Hydropower Project in Albania.** Sunrita led a team and advised on resettlement aspects of a hydropower project in Kalivac in Albania. Hydro which is a private construction company is seeking identification of resettlement and livelihood impacts due to the project and the formulation of RAP to international standards. Sunrita facilitated the process and was the international resettlement expert leading the effort.

**Social assessment for Allain Duhangan Hydroelectric Project (ADHP) in Himachal Pradesh.** RSWML is seeking partial financing from the International Finance Corporation (IFC) for the project. To fulfill the requirements of IFC's Environmental and Social Review of the project, ERM India had been invited to prepare detailed information on environmental and social impact assessment of the project, along with seven specialized studies and a reconnaissance survey of the proposed transmission line corridor, prior to IFC's approval on financing the project. Sunrita prepared a detailed RAP for

the project, recommended institutional and monitoring mechanisms and developed a detailed Public Consultation and Disclosure Plan for the entire project period.

**Training and Facilitation workshop on Hydropower Sustainability Assessment Forum (HSAF).** The World Bank is the facilitator for this multi-stakeholder roundtable on sustainability and Hydropower projects of the International Hydropower Association (IHA). Sunrita facilitated a three day workshop at the World Bank to assist in the drafting of HSAF protocol which can inform sustainable investments in Hydropower projects

**Socio-economic Impact Assessment of the Rajasthan Power Sector Restructuring Project, World Bank.** The socio-economic impact study involved providing an integrated and participatory framework for gathering analyzing, prioritizing and incorporating social information in developing and implementing the power reform programme in the state. The state power sector reforms process is being supported by the World Bank. ERM was also asked to develop a social strategy that will influence the decision making in the reform process, help monitor the impacts of the reforms on poor and vulnerable groups and identify steps to mitigate the hardships faced by these groups, if any. The study involved extensive field survey of over 1000 households in rural and urban areas in the entire state, an extensive consultations at the state, district and village levels. 3 stakeholder workshops were held as a part of this consultation process.

**Social and Environmental Analysis of the 2nd Rural Water Supply and Sanitation Project, Maharashtra for Water Supply and Sanitation Department, Govt. of Maharashtra & World Bank.** ERM conducted a social and environmental analysis, which a part of the project preparation study of the World Bank supported water and sanitation project. The objective of the study is to assist the GOM in designing the project taking into account the socio-economic characteristics of the target population and the environmental issues, so that the project / program delivers sustainable water and sanitation services to rural communities at large and poor and vulnerable groups (such as women, scheduled castes and scheduled tribes), in particular. The analysis was conducted in 20 villages spread over 5 districts covering different geographical locations in the state and more than 600 households. A separate **Indigenous Peoples Development Plan (IPDP)** was also prepared with extensive consultations and participatory PRA and planning activities with tribal communities in Gram Panchayats (local village representative bodies) in seven districts with high tribal concentration.

# Alan D. Trippel, C.P.G.

Partner



Al Trippel has worked in the mining industry and environmental consulting for over 25 years. Industry experience consisted of sulfide metallic mineral exploration, development, mine management, and environmental positions, including six years as the environmental, government and public affairs coordinator for a large precious and base metal mining complex in Nevada, USA. Consulting experience consists of EHS and Sustainability services including metallic and non-metallic mine permitting, baseline studies, Environmental / Social Impact Assessments, compliance audits, environmental management systems, compliance issue resolution, M&A due diligence, reclamation and closure, legislative development, public (including communities, media, NGOs, and Indigenous), and government agency affairs. Mr. Trippel also has experience with the International Cyanide Code.

Skills include developing pragmatic solutions to complex environmental challenges, and directing multidiscipline teams of scientists and engineers, and interfacing with industry and external stakeholders. Mr. Trippel has exceptional communication skills with all levels of business organizations, agencies, elected officials, trade associations, and the public.

Mr. Trippel has supported mining as well as chemical, automotive, electroplating, pulp and paper, forest products, petroleum, pharmaceutical, manufacturing, rail transportation, waste management, and property redevelopment clients in North America, Latin America, South America, Africa, Australia, China, Asia Pacific, UK, and Europe.

## Professional Affiliations and Registrations

- Society of Mining and Metallurgical Engineers

## Fields of Competence

- Metallic and non-metallic mining/process permitting, compliance, and closure/reclamation
- Mine Permitting and Environmental / Social Impact Assessments
- Public, Community, Media, NGOs, Indigenous, and Governmental Relations
- Legislative and Regulatory development
- Facility decommissioning, and comprehensive closure and reclamation planning
- Short and Long Term Financial Assurance
- Wastewater, storm water, surface /groundwater management (including Acid Rock Drainage)
- Groundwater investigations and remedial actions
- Wetland and wildlife management and mitigation
- Solid and hazardous waste management
- Geotechnical stability
- Asbestos abatement
- Landfill permitting and closure
- Air quality permitting and compliance
- Environmental quality monitoring
- Environmental risk assessments
- Due diligence for mergers and acquisitions
- Environmental management systems
- Pollution prevention and sustainable development
- Corporate Advisory Services
- Sustainable Development

## Education

- M.S., Geology, Colorado State University, 1985
- B.S., Geology, Michigan State University, 1981

## **Key Projects**

### **Minnesota, USA**

Mr. Trippel is currently the project manager for the third party multidiscipline team to prepare a full state-federal (NEPA) EIS for the proposed NorthMet Project, a polymetallic sulfide mineral mine on behalf of the State of Minnesota. A multi-volume draft EIS was issued in 2009, and approximately 3,800 comments were received. He coordinated the analysis and response to these comments. Additional responsibilities include analyzing natural and cultural resource baseline and impact predictions, alternatives analysis, cumulative effects analysis, and advising cooperating agencies on environmental management of sulfide mining operations, as applied to this high-profile proposed surface mine and mill. (2006 – present)

### **Nevada USA**

Mr. Trippel managed all environmental activities at a large, active gold mining (sulfide) facility in Nevada, including operational compliance, reclamation and remediation, and permitting. His environmental stewardship efforts won praise from state and federal agencies, operations staff, corporate officers, and special interest groups. As a result of his efforts, no violations occurred during his 6 years of responsibility, including NEPA, CWA, SDWA, CAA, RCRA, CERCLA, SARA, AHERA, and EPCRA.

Permitting activities included successfully leading state and federal permitting (including NEPA EIS) related to the high profile (due to sulfide content and potential for acid rock drainage impacts) Phoenix Project, a major expansion of mining, milling, and heap leaching. Tasks included primary coordination of internal engineers and management; outsourced scientists and engineers; local state and federal agencies; Native American tribal representatives; special interest groups; and the media. Mr. Trippel was instrumental in successfully defending the project on appeal; the project is now under construction. Also supervised multi-million dollar closure and reclamation program, which consisted of 170 inactive or historic mining facilities over 50 square miles. Project management included site evaluation, process wastewater treatment and disposal, evaluation and mitigation of acid rock drainage from waste rock and copper leach dumps, soil and groundwater remedial actions, dust suppression for large tailings disposal area, hydrocarbon impact mitigation, solid and hazardous waste treatment and disposal, landfill closure, asbestos bearing process piping disposal, re-contouring and re-

vegetation programs, environmental risk assessments, due diligence, and pollution prevention. (1995-2005)

### **Midwest USA**

Conducted comprehensive environmental audits of numerous large, well-established iron ore mining and taconite pellet processing facilities. Audits entailed extensive document review, interviews, and on-site inspections for compliance with mining, dam safety, wetland/stream protection, and reclamation permits, and for compliance with PCB, asbestos, solid and hazardous waste regulations. Audit findings and recommendations were used by the client in their goal of sustaining and improving their environmental compliance and stewardship at the operations. (2002 – present)

### **Michigan, USA**

Responsible for providing EIA, EHS compliance, and government/community relations support to a joint venture of large and small mining companies for exploration /development of a high profile new base- and precious- metal massive sulfide discovery at a greenfield site located in Michigan's Upper Peninsula. Evaluated pre-drilling environmental baseline conditions, provided EHS guidance during exploration and development activities, coordinated agency dispute resolution and field reclamation of surface disturbance. In addition, ERM facilitated the development and implementation of a comprehensive communications program to inform state regulators, elected officials, residents, and NGOs about the current project and potential impacts and benefits of a future mining operation. Represented the joint venture in public meetings, local and legislative initiatives, and led numerous site visits and field trips to inform stakeholders about mineral exploration, mining, environmental protection, and sustainability. (2002 to present)

### **Colorado, USA**

Responsible for successful development and production of open-pit underground gold-silver mines. Performed management functions for multi-million dollar projects, which included budgeting, supervision of employees and contractors, geostatistical reserve estimates, feasibility studies, sampling programs, metallurgical testing, geotechnical engineering, open-pit mine plan, scheduling, landwork, permitting, and public relations. (1986-1988)

### **Nevada, USA**

Responsible for leading a team of social scientists in determining the social and economic impacts to a rural community of simultaneous sulfide and oxide metallic mine startups, closures, and a large proposed power plant all owed by a large mining client. Project scoping included interviews with internal and external stakeholders to identify key issues, some of which were not identified in traditional environmental permitting. Results resulted in improved stakeholder relations, impact recognition, and management recommendations to minimize negative impacts and enhance positive impacts to the community. (2005)

### **Michigan, USA**

Mr. Trippel won praise from the Governor of Michigan, the Directors of the Department of Environmental Quality and Department of Natural Resources, and NGOs (Sierra Club, National Wildlife Federation, and Trout Unlimited) for representing industry on behalf of a client in preparing comprehensive new metallic sulfide mining legislation.

Two recent discoveries of sulfide mineral deposits in Michigan's Upper Peninsula sparked strong opposition and controversy over the adequacy of existing laws to protect the environment. Members consisted of state and local units of governments, tribes, environmental groups, academia, and industry. Mr. Trippel's strong expertise in mining issues and stakeholder engagement helped to resolve conflicts and build a workable statutory framework. The result was a bill which reflected the consensus of the stakeholders, and was passed unanimously by the House and Senate.

ERM continues to represent our client in multi-stakeholder rule and guidance making processes to compliment the new statute. The model for conflict and issue resolution developed by the work group is now

being used on other controversial topics in Michigan. (2004 – present)

### **Colorado, USA**

Participated in an internal ISO 14001 Environmental Management System audit for a large scale active base metal (sulfide) mining and processing operation. (2005)

### **Arizona, USA**

Provided technical support to design a passive remediation system for precious metal heap leach pad residual drain down at an industrial clients closed facility. (2003)

### **West Virginia, USA**

Participated in environmental compliance audit of a large underground coal mining complex. Responsibilities included mine permit compliance, reclamation, stormwater management, and protection of surface waters. (2007)

### **South Dakota, USA**

Successfully “unpermitted” an inactive, historic, large surface gold mine by conducting a detailed review and demonstration of all mine permit reclamation obligations were completed and that post-mining land use had been achieved. Worked collaboratively with the mining company and state agencies to prepare a package of documents to support the cancellation of the mine permit, and developed a Post-Closure Plan to manage long term collection and treatment of metal-bearing leachate from waste rock stockpiles. Testified before the State Board of Mining and Environment on this first-ever request. Approval was granted and the Board complimented ERM and our client on the thoroughness of the information presented.

### **Chile / Argentina**

Senior consultant on a third party review of environmental and social impact assessment processes for a proposed high profile gold mine located on the continental divide in the Andes Mountains. The project consisted of site visit, interviews, and preparation of a summary report to mining company management that assisted in responding to shareholder concerns (2006)

# Emma McKennirey

Project Manager, Impact Assessment



Emma McKennirey is a Consultant within ERM based in Toronto, Ontario

Ms. McKennirey is a Professional Engineer with eight years of experience in water resource management, mining and infrastructure projects. She is well versed in environmental and social impact assessment, hydrology, hydrogeology, hydraulics, water quality analysis, groundwater-surface water interaction and field investigations. Ms. McKennirey has worked across Canada and is familiar with a wide range of national and international regulatory environments and has a strong knowledge of international environmental and social impact standards.

## Professional Affiliations & Registrations

- Member, Professional Engineers Ontario
- Member, Canadian Water Resources Association

## Fields of Competence

- Environmental and Social Impact Assessment
- Hydrology
- Hydraulics
- Field investigations
- Development of engineering solutions
- Water quality analysis

## Education

- Bachelor's Degree of Applied Science, Civil Engineering, Water Resources Specialization, University of Waterloo, Canada, 2004
- Bachelor's Degree of Public Relations, Mount Saint Vincent University, Canada, 1999

## Languages

- English, native speaker
- French

## Key Industry Sectors

- Metals and Mining
- Energy
- Infrastructure

## **Key Projects**

### **Cobre de Panama, Panama, Inmet Mining Corporation, 2011.**

#### **Environmental Advisor**

Completed environment and social due diligence review of the project's environmental and social impact assessment and related management plans as they related to water resources (including climate, hydrology, hydrogeology, water quality and sediment and erosion control) and provided advice regarding improvements required to bring the proposed project up to international standards.

### **Bratsk Pulp Mill Rebuild, Russia, Ilim Group, 2010**

#### **Environmental Advisor**

Led the Export Development Canada environmental and social due diligence review of the environmental and social impacts of the proposed rebuild of one of the world's largest pulp and paper mills located in Siberia, Russia including benchmarking to IFC Performance Standards and OECD Common Approaches. Led coordination with Export Credit Agencies in Finland and Sweden.

### **Mackenzie Valley Winter Road Water Licensing, Canada, Ministry of Transportation, Government of the Northwest Territories, 2009**

#### **Water Resources Specialist**

Assessed the feasibility of predicting under-ice streamflow for over 20 ungauged basins in the NWT via hydraulic modelling or regional analysis to improve the NWT Department of Transportation's compliance with its water license to take water from the water courses to build the Mackenzie Valley Winter Road. Emma is liaised with the Sahtu Water Board and experts from Environment Canada and the University of Alberta to find a solution that was cost-effective and delivered reliable data.

### **Mary River Iron Ore Mine, Canada, Baffinland Metals Inc., 2009**

#### **Water Resources Specialist**

Provided hydrologic and hydraulic design of over 215 water crossings by world's most northern railroad located on Baffin Island as well as preliminary and detailed design of culvert crossings including installations in permafrost and mountainous terrain. Emma was the liaison between the engineering and environmental impact assessment teams for aquatic resources.

### **St. Andrews River Sustainable Yield Analysis, Canada, Town of Stewiacke, 2008**

#### **Water Resources Specialist**

Completed a sustainable yield analysis to predict low flow in an un-gauged basin in Nova Scotia to determine the impacts of projected water taking by the Town of Stewiacke based on projected growth into 2026. Advised Town Council regarding the risks associated with aggressive growth and recommended actions for the Town to ensure reliable water supply as the municipality grows.

### **Tulsequah Chief Mine Permitting, Canada, Redfern Resources, 2007**

#### **Water Resources Discipline Lead**

Managed the development of the water management plan for an 18-month construction phase of a new base-metal mine in northern British Columbia. Emma liaised with a large engineering team, construction contractors, and provincial regulating bodies. She modeled the water management system, developing operational procedures as well as maintenance and monitoring programs.

### **Tulsequah Chief Mine Barging Option ESIA, Canada, Redfern Resources, 2007**

#### **Water Resources Specialist**

Emma compiled historical and field data and conducted a literature review to provide a characterization of the Tulsequah and Taku Rivers in northern British Columbia to support the Environmental and Social Impact Assessment of a proposed project to barge ore from the Tulsequah Chief mine to Juneau, Alaska.

### **Back River Mine ESIA, Canada, Dundee Resources, 2006**

#### **Hydrology Discipline Lead**

Developed and managed a multi-year hydrology surface water monitoring program in the Northwest Territories to collect baseline hydrology data to support an upcoming Environmental Impact Assessment for a potential mine in the Northwest Territories.

### **High Lake Mine ESIA, Canada, Wolfden Resources Ltd., 2005**

#### **Hydrology Discipline Coordinator**

Emma implemented a three-year field hydrology program in the Western Arctic territory of Nunavut, completed annual field summaries, compiled meteorological and hydrological data and developed baseline hydrology reports for Environmental Impact Assessment. She also contributed to the water balance, water model, culvert design and water quality models.



# Alastair Gow-Smith

Consultant, IAP



Alastair Gow-Smith is a Consultant within ERM based in London.

Alastair has an educational background in Social Anthropology (BA) and Impact Assessment and Management (MA), from the University of Manchester. Alastair has been involved in a variety of projects including SIAs, Social Management Planning, Resettlement Planning and Artisanal Mining Management.

Alastair has substantial project experience within the mining, natural resource and infrastructure sectors. This social management experience has included recent in-country experience collecting socio-economic data in Burkina Faso, Turkey, Suriname and Ecuador as well as a strategic review of Community Development Agreements for the World Bank, including fieldwork in Ghana. Alastair has also been involved in several projects throughout sub-Saharan Africa and within Central Asia that have involved impact assessment and social management planning including substantial baseline data collection as well as coordination and project management of subconsultants.

Alastair has substantial experience of stakeholder engagement including interviews, focus group discussions and participatory rural appraisal / learning and action throughout a range of projects.

## Professional Affiliations & Registrations

- Member of the Society for Applied Anthropology

## Fields of Competence

- Social Impact Assessment, Social Management Planning, Resettlement Planning and Artisanal Mining Management.

## Education

- Masters in Environmental Impact Assessment and Management, University of Manchester, 2008
- Bachelor of Social Science (BSocSc) in Social Anthropology, University of Manchester, 2006

## Languages

- English, native speaker
- Basic Spanish
- Basic French

## Key Industry Sectors

- Extractives



## Key Projects

The following projects relate to Alastair's project experience.

### **Social Strategy, Suriname, Newmont Mining, 2010 Data collection and analysis**

Alastair gathered socio-economic data in potentially impacted communities surrounding Newmont's Merian exploration site to develop a social strategy for the Project. This included data collection from artisanal miners and a social risk assessment analysis; developing recommendations and a strategy going forward.

### **Social Impact Assessment, Ghana, Newmont Mining, 2010**

#### **Desk-based analysis**

Alastair contributed to a impact assessment team analysing socio-economic data gathered by ERM to develop an ESIA of Newmont's Akyem site. This SIA including an analysis of potential human rights and social impacts to affected communities.

### **Environmental and Social Due Diligence, UniCredit, Turkey, 2010,**

#### **Data collection and analysis**

Alastair helped to complete the environmental and social due diligence of a planned Nickel Mine in Turkey. This involved socio-economic data collection in potentially impacted communities and with other stakeholders surrounding the project. The Project ESIA was analysed against this ground truthing exercise for compliance with the Equator Principles.

### **Community Development Agreements (CDA) Study within the Mining Sector, Global, World Bank, 2010 Case study management and data collection.**

Alastair helped to compile a report for the World Bank concerning the current scenarios, opportunities and challenges facing CDAs within the mining sector. This included field work in Ghana and a series of interviews surrounding the successes and failures of CDAs within the mining sector. Interviews were conducted with a range of stakeholder groups and this fieldwork in was used in addition to case studies in Papua New Guinea and Argentina to develop a review of CDA application globally including an analysis of their successes and failures.

### **Fruta Del Norte Environmental and Social Impact Assessment, Ecuador, Kinross Aurelian, 2009-2010 Socio-economic researcher and Project Management**

Alastair provided a range of project management support to Kinross in relation to an ESIA. This included

managing subconsultants socio-economic field research and stakeholder engagement and data collection in relation to ASM. This project involved data analysis for a Social Baseline Study and Social Impact Assessment as well as developing an ESIA Report.

### **Belahouro Social Impact Assessment, Burkina Faso, Société des Mines de Belahouro - WEGA Mining, 2009.**

#### **Socio-economic and ASM researcher and impact assessor.**

Alastair carried out the field-based research and analysis required to prepare a Social Baseline and Impact Assessment of the Belahouro Gold Mine in Burkina Faso. This involved a prolonged period of fieldwork gathering quantitative and qualitative data, managing a team of enumerators and numerous stakeholder engagement meetings. A large factor in this project was the presence of ASM in the region which involved developing a series of specific stakeholder engagement activities and impact mitigation techniques within the SIA report. Having gathered the required data Alastair analysed the results to prepare a Social Impact Assessment guided by the IFC Performance Standards

### **Tulawaka Social Closure Risk Assessment, Tanzania, Barrick Gold, 2009.**

#### **Desk-based socio-economic data analysis.**

Alastair provided desk based assistance analysing qualitative and quantitative socio-economic data to assist develop a Social Closure Risk Assessment for the Tulawaka mine. Alastair had a desk based role assessing the data that was gathered based on a three week period of onsite fieldwork that included participatory research methods with employees, villages and other stakeholders.

### **Integrated Rural Development Plan 2009, Tanzania, Barrick Gold, North Mara, Desk-based data analysis**

Alastair provided desk based assistance designing an Integrated Rural Development Plan (IDAP) for Barrick Gold's Mine at North Mara to promote regional development and growth and institutional capacity in the North Mara area amongst resettled communities. The project involved assisting the formation of community based organisations, designing frameworks to promote social accountability, engaging with key stakeholders and designing and evaluating community and social infrastructure to promote rural development. For this project Alastair had a research role

### **Analysis of the CAR Mining Sector, Central African Republic, World Bank, 2009**

### **Artisanal Mining Management Researcher**

As part of a World Bank funded project Alastair provide desk-based assistance in developing an analysis of the Central African Republic mining sector in order to identify relevant actions for reforms and proposed enhancements, with the aim to promote and organize industrial as well as artisanal mining operations as instruments of poverty reduction and economic development. The project included a review of the Mining Code and associated regulations, as well as of legal documents as relevant to both artisanal and industrial sectors (environment, land, labour, health, health and safety, fiscal provisions, etc.), a review of Mining Agreements between the Central African Republic State and various mining companies and the review of the institutional capacity of the administration of mine

### **Sustainable Management of Mineral Resources, Nigeria, World Bank, 2008-9**

#### **Artisanal Mining and Socio-Economic Researcher**

Alastair was involved in a World Bank funded Review (including institutional audit and legal framework review) and analysis of rural livelihoods in Artisanal Mining locales providing desk-based support. This involved creating detailed recommendations and action plans for stakeholder engagement and sectoral reform. This project was undertaken as part of the current Sustainable Management of Mineral Resources Project (SMMRP).

### **Lubelska Environmental and Social Impact Assessment, Ukraine, CCI Lubelska -Lubel Mines, 2008**

#### **Social Economic Researcher**

Alastair provided desk-based support to analyse socio-economic data to develop an IFC standard ESIA of an underground coal mine in Ukraine.

### **Analysis of the CSR feasibility of the Mineral Sector, Gabon, Arcellor Mittal, 2008**

#### **Social Economic and ASM Researcher**

Alastair provided desk-based analysis of the CSR and business context of Gabon developing a report for Arcellor Mittal advising on the potential feasibility of investment within the manganese sector.

### **Lunda South Social Baseline Study, Angola, BHP Billiton, 2008**

#### **Desk-based socio-economic data analysis.**

Alastair assisted analyse socio-economic data to prepare a Social Baseline study of a mine in Angola. This included interrogating quantitative and qualitative data to prepare a Social Baseline Study to benchmark socio-economic conditions surrounding the mine and to raise

awareness of key social issues and opportunities for community development for companies, government, NGOs and other stakeholders. The project involved a Social baseline study of 14 communities. Particular attention was paid to internally displaced persons and constraints associated with conflict affected areas.

### **Oriente Province Social Characterisation Study, DRC, Confidential, 2008**

#### **Anthropological and socio-economic researcher**

Alastair helped to prepare a Social Characterisation Study for an exploration site in North-East DRC. This involved anthropological and socio-economic research and the development of a Social Characterisation Report providing guidance and advice to the company. The project was designed to assist the company with initial stages of community engagement at exploration stage, and to advise on managing community expectations.

## RESUMÉ

### PERSONALIA

*First name:* Salomon S.L.

*Last name:* Emanuels

*Year of birth:* 1951

*Date:* December 18<sup>th</sup>

*Sex:* Male

*Adress:* Livorno Beekhuizenweg 16

*City:* Paramaribo

*Country:* Suriname, South America

*Telephone:* (597) 520456/520484(werk); (597) 485610 (thuis)/08553324(mobiel)

*E-mail:* [salomonemanuels@yahoo.com](mailto:salomonemanuels@yahoo.com); [salomon@sr.net](mailto:salomon@sr.net)

### • Education

*Major:* Cultural and Social Anthropology, Catholic University of Nijmegen, the Netherlands

*Graduated:* Cultural and Social Anthropologist Msc, 1988

*Specialities:* Legal Anthropology and Social Geography of Developing Countries.

*Thematic keywords:* Anthropology; Community Development, Participation and Social Assessment; Indigenous and Tribal People Rights, Political and Religious Anthropology.

*Courses:* Post-Academic Courses “Financial Management and Quality Policy” ; “Marketing, Sponsoring and Fundraising”, Centre for Policy and Management, University of Utrecht, the Netherlands, 1995; “Charity Fundraising Management”, Institute of Charity Fundraising Managers Trust, London 1995; “Participation in Local Development”, Agromisa Foundation, the Netherlands, 2001.

### • Employment

*Type of work:*

- Director: 2002-2010, Equalance Foundation, Suriname.
- Consultant Nationaal Instituut voor Milieu en Ontwikkeling (NIMOS): Review of the Draft Environmental Impact Assessment Reports of the Staatsolie Refinery Expansion Project, December 2009 – January 2010.
- Program Manager, 2008-2009: Program Education for Work. A Program to help Youth in the Interior to get work by organizing vocational training. Supporting by ZZg and ICCO, the Netherlands.
- Local UNDP Consultant for the Economic Commission for Latin America and the Caribbean (ECLAC): Suriname: the impact of the May 2006 floods on sustainable livelihoods, March 2007.
- Consultant/Researcher ZZG/ICCO the Netherlands: Haalbaarheid van vakopleidingen in het binnenland van Suriname, May-July 2007.
- Consultant: Technical Support Consultation Process of Development Planning for the Interior. Ministry of Regional Development, October-December 2006
- Project Advisor/Trainer: Program for Strengthening of Traditional Authorities in the Interior. PAS/Equalance, 2003-2006. Research and Development of Training Program.
- Consultant/Researcher NIMOS: Social and Environmental Assessment; Unicef; Situation Analysis of Children in Brokopondo; UNDP/Small Grants Programme: Training Project Management for Target Communities, 2003-2005

- Lecturer: Anton de Kom University; Research Methods and Techniques, Culture and Development, Cultural Anthropology, 2003-2010.
- Project Advisor: Traditional Leadership, Land Rights and Empowerment: 2002-2003, Moiwana Human Rights Organization, Suriname.
- Programme Officer Community Development: 1998-2001, Bureau Forum NGO's, Suriname
- Street Corner Worker: 1993-1998, Amsterdam, the Netherlands.
- Trainer: Inter Cultural Communication for Government Officers and Minority Groups, 1988-1993, several municipalities in the Netherlands.
- Consultant: Development of Vocational Training Program for Refugees in the Amersfoort-Utrecht region. South-East Utrecht Province, 1990-1991, the Netherlands.
- Program Officer Education and Work: 1988-1993, Regional Office for Education, Amersfoort, the Netherlands.
- Community Worker: 1981-1988, Deventer, the Netherlands.

- **Knowledge of languages**

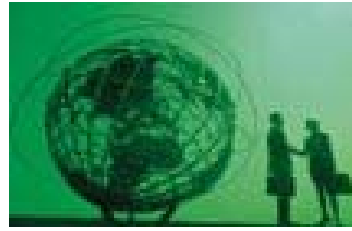
	<b>English</b>	<b>Dutch</b>	<b>Sranan</b>	<b>Saamaka/Ndjuka and other Maroon languages</b>
Speaking	Moderate	Excellent	Excellent	Excellent
Writing	Moderate	Excellent	Excellent	Excellent

- **Papers/Lectures**

- *The threat to Old Tradition in the Maroon village of Santigron*; Paramaribo, 2002
- *Description of the function of Traditional Authorities among the Maroons in Suriname*; Paramaribo, 2005 (unpublished project report).
- *Reflection on our National development: First Time, Today and Tomorrow*; Paramaribo, 2005.
- *Children of Brokopondo: A Situation analysis*; Ministry of Regional Development and UNICEF; Paramaribo, 2003.
- *Land Rights, Economical development and Ethnic Identity among the Maroons in Suriname*; Paramaribo, 2003.
- *We have problem, so we sell our forest. Report on a preliminary research about juridical status and utilisation of forest in the Hinterland of Suriname*; Paramaribo, 2002.
- *Politicization of Ethnic Identity*; Paramaribo, 2002
- *Land Policy of the Government: Land Rights Issue and the occupation of land in Suriname*; Paramaribo, 2002.
- *Sustainable Development: People First*; SWI, Paramaribo, 2000
- *Land Right Issue in the Hinterland: In what way it solved?* Paramaribo, 2000.
- *Involved, but not participating: Research on participation of Surinam people in immigrant policy in the municipality of Deventer*. Doctoral thesis. Catholic University Nijmegen, 1988.

# Matthew Kuniholm

Project Scientist



Matt Kuniholm is a member of ERM's Washington D.C. Social Consulting Team. He has experience working with public, private, and non-profit organizations in environmental, social and international development sectors. Most recently, he completed a two year contract managing community-based environmental conservation and economic development in Guatemala.

Mr. Kuniholm's work experience has focused on the relation between environmental management and socio-economic issues, particularly related to international development, social impact assessments, community relations, and stakeholder engagement. His work combines practical field skills such as stakeholder engagement activities, community relations, participatory rural appraisal techniques, and social gap analyses with analytic research skills, report writing and project management.

Past projects have included social impact assessments; stakeholder engagement programs; desktop social due diligence reviews; resettlement planning; municipal economic development; environmental monitoring of endangered species; forest mapping, management and incentive planning; artisanal mining engagement planning; community investment; developing and managing community based ecotourism projects, tree nurseries and reforestation; agricultural cooperatives; and projects involving environmental services.

Matt has lived and worked in the USA, Canada, Central America and Africa, and has experience on projects funded by international lending agencies, the UNDP-GEF; Geneva Global, a sub-contractor for USAID; the Austrian Development Agency; and national and international NGO's.

## Fields of Competence

- Social Impact Assessment
- Stakeholder engagement
- Community based and participatory development (PRA techniques, and participatory project design)
- Community relations and grievance mechanisms
- Artisanal and Small Scale Mining
- Conservation and monitoring of biodiversity and natural resources
- Conceptualization and development of innovative communication/reporting materials
- Work and living experience in North America, Central America, South America and Africa

## Education

- Houghton College, Houghton, New York
- Double Major: B.A. Biology, B.A. International Relations
- Magna Cum Laude, Deans List every semester

## Languages

- English (Native)
- Spanish

## Relevant ERM Project Experience

- **ESIA, Suriname, ongoing**  
ERM has been commissioned by Alcoa (Suralco) to conduct a detailed ESIA and feasibility analysis of the proposed bauxite mining activities. Matthew is a member of the social impact assessment team responsible for conducting household surveys, participatory rural appraisals (PRA) and stakeholder consultations.
- **Social Impact Assessment of Gold Mine, Newmont, Ghana, 2010**  
Carried out field work, analysis and writing of social impact baseline and assessment of communities indirectly affected by a proposed gold mine in the eastern region of Ghana. Field research techniques included PRA methods such as focus groups discussions, community profiling and seasonal calendars, as well as secondary research. The project also involved a household census of directly affected households, a human rights impact assessment and mitigation planning for issues including small scale mining.
- **Community Development Framework Case Study Report, World Bank, 2010**  
Assisted the planning, research and drafting of a case study report on the global use of CDAs in both regulated and voluntary contexts. Specific case studies included projects in Argentina, Ghana and PNG. Tasks included secondary research and telephone interviews with key stakeholders worldwide.
- **Complementary ESIA for El Salto Hydropower Project, Nicaragua, 2010**  
Supported the development of a complementary ESIA according to IFC standards for a proposed Hydropower Project in Nicaragua and wrote the social baseline, social impact and social management plans. Key social issues included resettlement, indigenous peoples, stakeholder engagement and national parks and protected areas.
- **ESDD Review support for Atotonilco wastewater treatment plant, Mexico City, 2010**  
Performed a gap analysis of project EIA/Concession documentation and IFC Performance Standards, EHS Guidelines, Equator Principles and secondary research on social baseline and impacts.
- **Regional Stakeholder Engagement Strategy Planning, Kinross Gold, Chile, 2010**  
Supported the research, planning and development of a comprehensive Stakeholder Engagement Strategy for three gold mines, including project specific Action Plans, grievance mechanism, documentation system, community investment and internal staff training.
- **Stakeholder Engagement Strategy and Support, Cerro Casale (CMC), Chile, 2009-2010**  
Supported the design and implementation of corporate social responsibility programs and strategies for world-class gold mining project, including stakeholder engagement activities, public consultations and 'open house' events, grievance mechanism development and training and community investment strategy design.
- **Social Risk Management Tools, Teck, 2009-2010**  
Drafted a Stakeholder Identification and Mapping Tool, High-Level Social Risk Identification Tool and a Guidance Note on Resettlement Action Planning to accompany full suite of other social risk management tools to be rolled out across all Teck mining projects.
- **Support for ESIA of proposed gold mining site, Guyana, 2009**  
Supported the development of social baseline and impact chapters of a full ESIA for a proposed gold mine, and wrote the Artisanal and Small Scale Mining (ASM) Management Plan.
- **Best-Practice Guidelines for Involuntary Resettlement, Mongolian, 2009**  
Researched and drafted client-specific guidelines for carrying out resettlement planning and implementation for planned coal mining projects in Mongolia.
- **ESDD Review support for highway construction project, Peru, 2009**  
Performed gap analysis of project EIA/Concession documentation and IFC Performance Standards, EHS Guidelines and Equator Principles.
- **Research and preparation support for the development of "Decommissioning and Closure of Oil Fields and Mines: A Toolkit to Assist Government Agencies," 2009**

Aided in the compilation of comments, stakeholder input, research and editing of the World Bank sponsored toolkit.

- **Review of Land Rights Study for the Roundtable on Sustainable Biofuels, 2009**

Aided in the review and preparation for a special study on land rights and land use rights in sustainable biofuel production.

## **Past Experience**

### **United States Peace Corps, Guatemala**

*Environmental Conservation and Income Generation*

*Volunteer (Jan 2007 – Apr 2009)*

- Obtained over \$200,000 in funding for social and environmental development projects through the Austrian Development Agency and the UNDP-GEF and fulfilled project goals through successful planning, training and administration
- Conducted community characterizations, stakeholder analyses and needs assessments using participatory, community based methods
- Enabled municipal forestry office to conduct forest diagnostics, create maps, and process applications for inclusion in a national forest management incentive program, leading to the protection of over 25 private and public forest properties in two years
- Initiated an agricultural cooperative employing over 45 farmers selling non-traditional export crops
- Designed and carried out a three phase year-long community-based conservation project to protect an endangered bird species, incorporating environmental education, reforestation, and monitoring.
- Formed multi-sector municipal ecotourism development committee and took initiative in training and empowering local organizations
- Developed a professional spoken and written ability level in Spanish
- Adapted fully to the rural-Mayan community as a prerequisite to work effectively in the local community context

# Sinang Lee

Consultant, Health/Social Specialist



Ms. Sinang Lee is a Health/Social Specialist in our Impact Assessment Practice (IAP) with an interdisciplinary background in environmental sciences, public health and international development. Sinang's expertise lies in assessing risks and impacts of development projects from an integrated environmental, social and health lens. She has over eight years of experience in engaging various stakeholders in managing environmental health risks and natural resources at the local, national and international levels.

Her diverse projects include integrating health impact assessment (HIA) into US NEPA Review/EIS and ESHIA processes, building proper chemicals management capacity throughout Central America, promoting health and safety interventions among agricultural workers in Cambodia, and leading tribal engagement efforts in watershed management.

Sinang has specific skills in conducting HIAs/SIAs; applying participatory rural appraisal techniques in developing country context; designing social/health assessment surveys; evaluating quantitative/qualitative data; and creating community engagement trainings.

Prior to joining ERM, Sinang worked for State of Washington, Pacific Northwest Agricultural Safety and Health Center, US EPA's Office of International Affairs and US Agency for International Development (USAID). She has presented her work at the International Scientific Conference on Occupational and Environmental Health in Hanoi, Vietnam; and at US EPA's Watershed Management Conference.

Sinang holds a Master of Public Health degree in Environmental and Occupational Health Sciences from University of Washington and a Bachelors degree in Environmental Sciences from UC Berkeley.

## Fields of Competence

- Health/Social Impact Assessments
- Integrated ESHIAs
- Stakeholder Engagement and Public Consultation
- Environmental Site Assessments
- Environmental Regulatory Compliance

## Education

- MPH, Environmental and Occupational Health Sciences, University of Washington, U.S. 2006
- BA, Environmental Sciences, UC Berkeley, U.S. 2001

## Languages

- English, native speaker
- Khmer, native speaker
- Spanish, intermediate

## Key Industry Sectors

- Local and Tribal Governments
- Agriculture
- Oil, Gas & Mining
- Manufacturing
- Non-Governmental Organizations

## Honors & Awards

- UW Graduate School Top Scholar, 2004-2005
- Puget Sound Partners for Global Health Grant Recipient, 2005

## Publications

- Fluorescent Tracer Manual: An Educational Tool for Pesticide Safety Educators  
<http://depts.washington.edu/pnash/FT.php>
- Bear-Evans Watershed Temperature and Dissolved Oxygen Total Maximum Daily Load: Water Quality Improvement Report  
[www.ecy.wa.gov/biblio/0810058.html](http://www.ecy.wa.gov/biblio/0810058.html)



## Key Projects

### **Integrated ESHIA for Offshore Oil Development Project, Confidential, Timor-Leste, 2011-present.**

Currently serving as technical lead for the health baseline assessment and impacts analysis for the offshore oil development project. Critically reviewing draft assessments to ensure public health is appropriately addressed.

### **Integrated ESHIA for Offshore Minerals Petroleum Project, Confidential, Greenland, 2011-present.**

Prepared a health baseline study, with a focus on the healthcare system and health profile in Greenland, including capacity and services at the municipality and national levels and the implications of a recent healthcare reform. The study involves a review of secondary data and field data collection (including interviews and consultation); and an assessment of health impacts.

### **Social Baseline Study for the Deepwater Horizon Gulf of Mexico, Confidential, USA, 2010-present.**

Prepared a social baseline study to understand the community health issues associated with oil and gas activities in the Gulf of Mexico. The study is prepared as part of anticipated permitting requirements as well as to meet internal corporate sustainable development priorities.

### **Best Practices in Community Health and Safety, Inter-American Development Bank (IDB), 2010-present. Consultant**

Supported the development of case studies in managing community health and safety risks and impacts in IDB-funded projects in transport, energy, extractive, agri-business and manufacturing sectors.

### **Corporate Social Responsibility Training Program, Canada, Barrick Gold Corp, 2010-present. Consultant**

Currently designing e-learning modules and facilitated workshops to operationalise Barrick's Community Relations Management System throughout its global operations. Training topics include CSR and community engagement.

### **HIA Integration into Point Thomson EIS, Alaska, Confidential, 2010 - present. Consultant**

Responsible for integrating a state-developed HIA into the proposed project's EIS as part of the NEPA Review process. HIA evaluated health impacts from the

proposed oil and natural gas condensate extraction operation.

### **HIA as part of the ESIA for Suralco Nassau Bauxite Mine Project, Alcoa/Suralco, Suriname 2010 - present. Consultant**

Completed a high-level health risk assessment as part of the mine and haul road project's ESIA process. The screening involves an assessment of the potential community health impacts and risks associated with the project, existing health vulnerabilities among local communities; and other potential factors, which alone or combined, may warrant a full HIA. Reviewed secondary data sources to develop country and regional level health profiles.

### **Stakeholder Engagement Tools, Canada, Teck Mining Company, 2010. Consultant**

Developed community engagement protocols and guidance documents, including the guidances on How to Build a Community Team, Community Health and Engagement Planning.

### **Watershed Management Plan, WA State Department of Ecology, 2006-2009. Project Manager**

Managed the stakeholder involvement process to engage citizens, tribes and local governments in preparing science-based watershed management plans (or TMDLs). Led and facilitated stakeholder advisory groups and public meetings. Effectively communicated technical concepts in reports and presentations for the public. Served as community liaison to 7 community advisory councils.

### **Pesticide Safety Intervention Tools for Agricultural Workers, Pacific NW Agricultural Safety and Health Center, USA and Cambodia, 2005-2006. Researcher**

Evaluated the effectiveness of an innovative pesticide safety intervention tool. Designed and tested 17 field trainings using PRA techniques with over 200 farmers in Cambodia. Collected and analyzed qualitative data from critical article reviews, key informant interviews and focus group observations. Authored a NIOSH-funded guidance manual for Pesticide Safety Educators.

### **Chemicals Information Exchange Network, Central America, US Environmental Protection Agency, Washington, DC, 2002-2003. Project Manager**

Collaborated with UN Environmental Programme and a Costa Rican NGO to plan 8 technical assistance workshops to build proper chemicals management

capacity throughout Central America. Promoted the use of the internet to access proper chemicals information.

**Presidential Water for the Poor Initiative, US Agency for International Development, Washington, DC, 2003-2004. Database Manager**

Tracked the indicators of success and progress of the largest Presidential Initiative, *Water for the Poor*. Coordinated with 75 field offices worldwide to collect, under a strict deadline, funding data and case studies for the annual report to Congress and the White House.

**Montrose/Palos Verdes Shelf Sediment Cleanup, US Environmental Protection Agency, California, 2003. Community Liaison**

Conducted a multi-ethnic angler survey to gather fish consumption habits of immigrants fishing at a DDT- and PCB- contaminated sediment Superfund site off the coast of Southern California. Results guided the development of a nationally-recognized community-based health education and outreach program.

**San Jose Community Gardens, UC Berkeley Department of Environmental Sciences, CA, 2000-2001. Researcher**

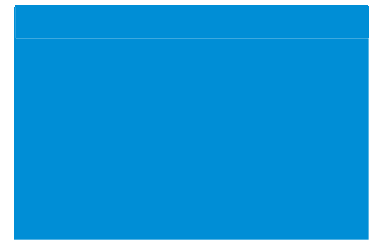
Evaluated the social and health benefits of community gardens as perceived among immigrants and American-born gardeners. Designed the self-administered questionnaire with translations to Spanish, Vietnamese, and Bosnian. Study promoted the value of green spaces to help immigrants resettle in US towns.

**Antimicrobial Properties of Medicinal Plants, Tropical Biology Institute, Costa Rica, 2000. Researcher**

Interviewed rural community members in Spanish on the traditional uses of medicinal plants. Tested the antimicrobial properties of tea extracts from two medicinal plants.

# Emlen Myers, PhD

Senior Consultant



Dr. Myers has 30 years of professional experience, including 18 years of experience as a consultant. He currently serves as Senior Consultant on social and cultural heritage issues in the Washington, DC office of ERM, where he focuses on international projects in archaeology, and on project impact assessment. Myers has played a principal role in over 100 consultancies for multinational commercial clients, multilateral lending institutions, and for U.S. Federal, state and local agencies.

In 1988-2001, Myers was Senior Consultant in the Bolivian office of a former employer, working on the environmental compliance team and directing the archaeology program for two multinational pipeline projects in Bolivia and Brazil. He has geographically wide-ranging research and compliance experience, having managed projects and conducted investigations throughout the United States and in Albania, Georgia, Greece, Greenland, Morocco, Romania, Spain, Bolivia, Ecuador, Mexico, Panama, and Peru.

Myers' consulting experience includes project-driven environmental planning studies (e.g. EA, ESHIA and SEA) in North, Central and South America, and Eastern Europe, including studies for large-scale projects sponsored by the World Bank, International Finance Corporation (IFC), InterAmerican Development Bank (IADB) and U.S. Overseas Private Investment Corporation (OPIC). He is highly experienced in government and agency coordination for heritage and cultural resources projects of all types. He has published several major policy analyses and research works in the area of cultural resource management, authored technical articles in refereed scholarly journals, and assisted the World Bank/IFC and U.S. National Park Service in developing policy guidance for heritage management issues.

Prior to becoming a consultant, Myers was a Post-doctoral Fellow and then Visiting Scientist at the Smithsonian Institution, from 1984 to 1991, and a heritage policy analyst at the U.S. National Park Service's Archaeological Assistance Division in Washington, DC, 1991 to 1992. He has prior research, study, and employment experience in North Africa and the Middle East from 1977 until 1984 when he received his doctorate for an ethnographic and archaeological project conducted over five field seasons in Morocco.

## Fields of Competence

- Archaeology and Cultural Heritage Management
- Public Presentation of Archaeology and Cultural Heritage
- Social and Environmental Impact Assessment

## Credentials

- Ph.D., Anthropology, Binghamton University, 1984
- M.A., Anthropology, Binghamton University, 1978
- B.A., Anthropology, University of Michigan, Ann Arbor 1975
- Meets U.S. *Secretary of the Interior's (36-CFR-61) Professional Standards for Historic and Prehistoric Archaeology.*

## Languages

- English – native
- Spanish – good (speak and read)
- French – working knowledge (read)
- German – working knowledge (read)

## Key Projects

**Greenland Smelter and Port Project - Alcoa Aluminium - Greenland.** Serves as cultural heritage specialist for this project's ESHIA team. Coordinating the Greenland National Museum archaeological field studies and preparing cultural heritage baseline documentation for ESHIA. The project includes a smelter, port, hydroelectric power generation plant, and electrical transmission line which will be sited and built in eastern Greenland. May 2008 - May 2010.

**Cerro Rico Mine Project Heritage Evaluation - Potosí Bolivia.** Since pre-colonial times the Cerro Rico Mine was recognized as one of the richest sources of Silver in the World. Colonial exploitation of the mine was a major source of wealth for the Spanish Empire in the seventeenth and eighteenth centuries. The Potosí Mine is now a World Heritage Site and a major tourist attraction. For a confidential client, Myers prepared an archaeological feasibility study for a proposed new mining project at Cerro Rico, reviewing archaeological studies prepared for the client and evaluating the planned activities in relation to international cultural heritage management standards. 2000



**UNOCAL - "Sol de Mañana" Geothermal Energy and Silver Mine Project- San Cristóbal, Bolivia.** Supported archaeological study in support baseline environmental assessment for a geothermal project to support silver mine development east of Laguna Colorada, within "Eduardo Avaroa" National Reserve (Sud Lipez, Potosí) at south-eastern Bolivia. Three potential geothermal production areas (Sol de Mañana, Apacheta-Aguita Brava and Juaylla Hara) were investigated to determine existing conditions (geology, biology, archaeology, meteorology, and water and air quality control.) Project also included feasibility study performed together with TDE (Bolivian Electricity Transport Utility) for a transmission line (167 km length) from Sol de Mañana geothermal production area to San Cristobal town. The study focused on environmental feasibility of the project alternatives.1998.

**Trans Adriatic Pipeline (TAP) – Cultural Heritage Coordinator – Albania, Greece, Italy.** ERM is preparing a number of pre-construction environmental planning studies for TAP including ESIA's in each of the three countries for this high priority project that will bring natural gas from the Caspian to the European Union. As a part of the ERM TAP team Myers is coordinating archaeology and other cultural heritage issues managing national archaeological subcontractors in each of the three countries to assure that national IBRD cultural heritage standards are met. Began in 2009.

**World Bank/International Finance Corporation - Cultural Heritage Consultant - Washington, DC.** Prepared implementation guidance for Environmental and Social Performance Standards focusing, providing key technical expertise for archaeological and cultural heritage component (PS-8) of this international standard for the environmental and social sustainability of commercial projects. 2006.

**Panama Canal Expansion Project - Panama Canal Authority (ACP in Spanish) – Panama City, Panama.** Serves as lead consultant responsible for archaeological and social issues on a team of international consultants charged with preparing semestral reports to the ACP and to its international lenders group, regarding alignment of the Expansion Project with the Equator Principles, an international benchmark for social and environmental sustainability. Reports assess the degree to which ACP, through the efforts of its project contractors, is complying with the projects management plans, which represent impact avoidance and mitigation commitments of the project ESHIA. Project duration is from September 2008 – June of 2014.

**Baba Multi - Purpose Hydro Project – Norberto Odebrecht - Buena Fé, Ecuador.** Independent field auditor and advisor to local project consultants, *Diagonal Urbano* and *Efficacitas* focusing on resettlement plan, public consultation, and cultural resources issues covered by project EIA. Assisted with IADB coordination of the above technical studies. 2006.

**PERU LNG Project – Hunt Oil Company – Lima, Peru.** Serves as Contract Manager and Technical Director for Construction Phase Archaeological Master Services Agreement (MSA). Under the contract, ERM Peru provides a range of field archaeological services and senior staffing to Client. Field services include archaeological monitoring and rescue excavation of "chance finds." Contract began July of 2008 and will conclude in June of 2010.

**PERU LNG Project – Hunt Oil Company – Lima, Peru.** Served as Client Technical Representative in Archaeology and Cultural Resources. Responsible for overseeing contractor work in compliance with Peruvian national standards for archaeological compliance for this approximately 600 km-long pipeline project which stretches from Amazonia to coastal Peru. The project will export liquid natural gas (LNG) from Peru to markets in the Pacific Rim. He was also responsible for coordinating with contractors and project staff to meet Cultural Heritage Protection Standards of the project's international lenders, including InterAmerican Development Bank (IADB) and World Bank/International Finance Corporation (IFC). Assignment was from February 2007 to June 2008.

**Archaeological Monograph for Bolivia - Brazil Natural Gas Pipeline – GasTransBoliviano – Santa Cruz, Bolivia.** Researched and wrote a book-length monograph published simultaneously in English and Spanish entitled *East of the Andes, South of the Amazon*. The book includes detailed description and illustrations of field investigations and of artifacts recovered from numerous archaeological sites uncovered by Myers' consultant archaeological team, along with the results of special analyses including C-14 dating of charcoal samples and of extracted human bone collagen, and trace-element analyses of pottery. The volume was widely praised by museum and university specialists as exemplary effort in modern project driven archaeology, and for its discovery of previously unidentified prehipanic cultures of the dry lowlands of eastern Bolivia. 2000.

**La Chorrera Potable Water Project Feasibility Study - InterAmerican Development Bank – Panama City, Panama.** Accompanied IDB due diligence team (finance, technical and environmental) on a trip to Panama to evaluate financing potential for a proposed Panama Canal Authority potable water project. He prepared the social and environmental feasibility report for IDB based on data review and trip findings. 2007.

**Client Confidential - Natural Gas Pipeline - Brazil and Uruguay.** Conducted archaeological desk review for client feasibility study of proposed Uruguay to Brazil natural gas pipeline, Porto Alegre, Brazil. 1998.

# Maggie Cawley



Maggie Cawley is a consultant with ERM based in Annapolis, Maryland. She has over seven years experience in environmental and social impact assessments, federal, state and local government planning, and real estate development. Ms. Cawley has prepared socioeconomic impact assessments, comprehensive plans, water resources plans, municipal growth plans, housing reports, and demographic analyses. Additional experience includes housing assessments, research and writing on green building policy, sustainable communities, and environmental justice issues, as well as the facilitation of public meetings as part of community planning projects.

Through her studies at Johns Hopkins University, Ms. Cawley is exploring the use of Geographic Information Systems (GIS) to better understand health and social trends and impacts. In her most recent work, she used GIS to test assumptions about the spread of Lyme disease in southeastern Pennsylvania. Future coursework will explore the use of GIS in epidemiology, and remote sensing. Through her knowledge of GIS, Ms. Cawley has provided support to projects related to landfill remediation studies, cultural resources, impact assessments, green infrastructure plans, growth studies, reuse assessments, and comprehensive land use plans.

Ms. Cawley's background in environmental and social planning, impact assessment and stakeholder engagement has enabled her to provide dependable and responsive support on a diverse range of public- and private-sector projects.

## Fields of Competence

- Environmental, Social & Health Impact Assessment (ESHIA)
- Community Relations & Stakeholder Engagement
- Geographic Information Systems
- Comprehensive Land Use Planning
- Demographic and Socioeconomic Analyses
- Water and Wastewater Capacity Assessments
- Hazardous waste operations & emergency response (HAZWOPER)

## Education

- Certificate in Geographic Information Systems, Johns Hopkins University, Ongoing.
- Masters of Urban and Regional Planning, Virginia Commonwealth University, 2008.
- Certificate in Urban Revitalization, Virginia Commonwealth University, 2006.
- Bachelor of Arts, International Studies: World Politics and Diplomacy, University of Richmond, 2003.
- University of Queensland, Brisbane, Australia, Study Abroad, 2001.

## Key Industry Sectors

- Power
- Oil and Gas
- Government
- Mining

## Languages

- English (Native)
- German (Intermediate)
- Spanish (Basic)

## Selected Key Projects

**Environmental and Social Impact Assessment, Suralco Nassau Plateau Bauxite Mine, Suriname. 2009-present. Planner, Data Analyst, GIS Specialist.** Providing support on multiple aspects of the project, including transport corridor selection, hydrologic data analysis, and GIS management. Support for the identification of the preferred transportation corridor between the proposed mine and an existing aluminum refinery included a GIS-based evaluation of the environmental and social constraints within each of the corridor alternatives. Led the organization of field data and supported data analysis for hydrologic investigations, including the interpretation of historic and recent precipitation data and piezometer readings. Completed barometric corrections and QA/QC assessment of data and collected additional hydrologic data for statistical development of synthetic hydrographs and recurrence interval precipitation and stream flows. Lead GIS Specialist, creating maps and providing analysis for all aspects of the project. This effort also entails the development of original data, including a stream system layer that was created based on a local topographical survey to support the delineation of the mining limits.

**Housing Survey and Rainwater Harvesting System Installation, Aguayuda, Barra del Colorado, Costa Rica, 2011. Consultant.** Assisting in a pilot project to provide safe drinking water to a remote Costa Rican community through the construction of rainwater harvesting systems. Upcoming tasks will include a survey of 80 households, which will be the basis for evaluating the feasibility of installing individual potable water systems for each home in the community.

**Deepwater Socio-economic Baseline Study, Gulf of Mexico, 2010 to present. Planner.** Assisted Shell Corporation in the development of a socio-economic baseline for the Gulf of Mexico region in the United States. Ms. Cawley evaluated existing social cohesion, economic conditions, cultural resources, local history, and development priorities. The baseline effort will feed information into Shell's long term social investment decision-making.

**Environmental Justice Assessment, Biomass Power Plant Site, Sampson County, North Carolina, 2009. Planner.** On behalf of a private biomass power plant company, conducted socioeconomic, demographic, and environmental justice assessments for a potential biomass plant site in Sampson County, NC. Designed a GIS-based

demographic analysis of the area surrounding the potential power plant site and developed a demographic comparison with other areas in this region containing poultry plants and other agricultural operations. Results were used to make recommendations on communicating and potentially mitigating social and health impacts on the surrounding community.

**MC252 Incident Response, Gulf Coast, USA, 2010. Liquid Waste Specialist.** Handled logistics and liquid waste tracking from offshore transport to on-shore decontamination and disposal. Used GIS to provide site mapping support and illustrate stormwater runoff patterns.

**68th Street Landfill Site Remediation, Baltimore, Maryland, 2008-present. Community Relations Liaison.** Led community relations activities in conjunction with EPA to maximize public awareness and involvement and minimize health and social impacts on the community. Conducted personal one-on-one interviews with area residents to solicit public opinions, facilitated workshops and developed mailings.

**Regional Landfill Siting Study, Confidential Client, Maryland, 2010. Planner.** Used GIS-based screening criteria to identify and compare land suitable for a multi-county landfill in the eastern United States. The project involved the design and application of criteria related to the social, environmental, and engineering aspects of the landfill, and included preliminary design and layout of the landfill and ancillary facilities.

**Nanjemoy Housing Assessment, Charles County, Maryland, 2010. Lead Planner.** Led a housing survey to assess the living conditions of the residents of rural Nanjemoy, Maryland. Created a mail survey and held multiple public meetings to identify existing housing needs and barriers to improved living conditions.

**Water Resources Elements (WRE), Maryland Statewide, 2008-2010.** Project planner for the development of WREs for the Comprehensive Plans of six counties and four municipalities in Maryland. Each WRE evaluates the impacts of proposed future land scenarios use on drinking water and wastewater treatment capacity, as well as its contribution to nutrient loading from point sources and stormwater runoff.

**Comprehensive Plans. Maryland Statewide, 2008-2011.** Project planner and GIS specialist assisting in the preparation of multiple comprehensive plans for local governments in Maryland. Comprehensive Plans are the basis for laws and decisions related to land use and investment in public infrastructure and services.

# Ben Sussman, AICP



Mr. Sussman has more than ten years' experience in local and regional comprehensive planning, transportation planning, and urban design. He has prepared comprehensive plans and community plans for small and large cities and unincorporated communities throughout Maryland, with particular emphasis on the linkages between land use, growth, and water resources. He has also developed and evaluated regional land use scenarios; waterfront plans; and municipal economic analyses. Mr. Sussman places emphasis on public presentations and public engagement as a critical part of community planning projects.

As a transportation planner, Mr. Sussman has evaluated vehicular and rail transportation options for industrial, commercial, and residential land uses. He has prepared EIS documentation in support of FTA New Starts authorizations (focusing on land use/transit relationships), and also has considerable airport planning experience, with a particular focus on "landside" facilities and operations (curbs, parking facilities, and consolidated rental car facilities).

Mr. Sussman has prepared EIS and EA evaluations of the land use, transportation, visual/aesthetic, socioeconomic, and environmental justice impacts of military airspace, natural gas drilling sites and pipelines, hydroelectric projects, and other proposed facilities.

## Professional Affiliations & Registration

- American Institute of Certified Planners
- American Planning Association

## Fields of Competence

- Comprehensive Planning
- Land Use Planning
- Transportation Planning
- Environmental Impact Assessments
- Brownfields
- Policy and Research
- Urban Design

## Education

- MCRP, Georgia Tech, 2002.
- B.S., Science, Technology, and Society, Stanford University, 1998.



## Key Projects

### Comprehensive Planning

**Comprehensive Plan, Cecil County, MD** – Task manager for development of the Water Resources Element which links growth and land use decisions to the availability of water and sewer infrastructure, and to impacts on non-point source pollution and stormwater management. Involves coordination with the County’s municipalities, its Citizens Oversight Committee, and state officials.

### **Subregion 5 and 6 Master Plans, Maryland-National Capital Park and Planning Commission, Prince George’s County, MD**

– Task manager responsible for transportation planning and management of GIS resources for two separate Master Plans for adjacent areas in Prince George’s County, MD. Together, Subregions 5 and 6 encompass nearly one-third of the County, including large portions of the “developing” and “rural” tiers.

**Green Community Manual, MD** – Project manager for the development of a sustainability guidebook for Maryland’s downtowns. The Manual, jointly sponsored by the Maryland Department of Natural Resources and Department of Housing and Community Development, gives practical guidance on ways that Maryland’s downtown business districts can be more environmentally, economically, and socially sustainable.

**Sustainability Plan, West Des Moines, IA** – Part of an interdisciplinary ERM team assisting the City of West Des Moines in defining its sustainability goals, and in implementing those goals through policies, programs, and updates to its Comprehensive Plan.

**Comprehensive Development Plan, Garrett County, MD** – Senior planner for an update of the Comprehensive Development Plan for Maryland’s westernmost county. Developed a master plan for the Deep Creek Lake region, the County’s economic engine, where growth and development pressures are the strongest. Developed the Water Resources Element, the first county-level element adopted in Maryland.

**Comprehensive Plan, Town of Boonsboro, MD.** Project Manager for an update of the Town’s Comprehensive Plan. Boonsboro’s most important planning challenge is growth, specifically the annexation of nearly 1,000 acres of land—which more than doubled the Town’s size. ERM is helping the Town

to define the amount and phasing of new development on this annexed land, and will prepare a Water Resources Element to define how the Town would be served by drinking water and sewer systems.

**Water Resources Elements, Dorchester and Talbot Counties, MD** – Project manager for the preparation of Water Resources Elements for two adjacent counties on Maryland’s Eastern Shore. The elements will evaluate water demand, wastewater demand, and nutrient (nitrogen and phosphorus) loading from existing and projected future development.

**Comprehensive Plan, City of Hagerstown, MD** – Senior planner and analyst for this update to the city’s Comprehensive Plan. Responsible for developing plan goals, objectives, and policies in conjunction with Planning Commission. The plan included extensive guidance on water and sewer capacity issues. Created all maps and graphics and oversaw all editorial and layout aspects of the plan document.

**Municipal Growth Element, Town of Bel Air, MD** – Project manager for the preparation of a Municipal Growth Elements for the County Seat of Harford County, north of Baltimore. The element must delineate the Town’s future annexation, and must demonstrate that the Town has adequate infrastructure and public facilities to accommodate projected population growth.

**LaVale Region Plan, Allegany County, MD** – Planner for a regional comprehensive plan for an area of Allegany County centered around the National Road (US 40 Alt). The plan established future policies for growth, land use, transportation, water resources, and community facilities.

**Worton and Butlertown Village Master Plan, Kent County, MD** – Project planner for a “miniature comprehensive plan” for two adjacent rural villages in central Kent County. Worton and Butlertown are facing growth pressures, and the Village Master Plan conveyed the community’s vision for future land use, zoning, public facilities, open space, and urban design.

**Comprehensive Plan, City of Frederick, MD** – Project planner and analyst for this update to the city’s Comprehensive Plan. Analyzed existing employment and helped develop an Economic Profile for the city. Also compared employment trends for the city to the county, region, and nation. Oversaw all editorial, graphic, and layout aspects of the plan document.



## Key Projects (cont.)

**Wye Mills Area Community Plan, Wye Mills, MD** – Project planner for a study to establish a new economic development center (and Priority Funding Area) in the vicinity of Chesapeake College in Queen Anne’s County. The project involved balancing economic development, community planning, environmental, and infrastructure (water and sewer) demands.

**Landscape and Setting Protection Plan, St. Mary’s College of Maryland, St. Mary’s City, MD** – Project Planner for a study to help the College and Historic St. Mary’s City evaluate the threats posed to their scenic and historic landscape from the potential development of nearby land. The study included an analysis of threat levels, as well as a series of recommended strategies for protection, such as fee-simple land purchases, scenic easements, and Transfer of Development Rights.

**Bucks County Waterfront Revitalization Plan, Lower Bucks County, PA** – Project planner for a multi-disciplinary effort to help guide the future growth, development, and redevelopment of six Pennsylvania municipalities along the Delaware River. Developed general principles for the project area, as well as urban design concepts for targeted revitalization areas. Oversaw all editorial, graphic, and layout aspects of the plan document.

### Transportation Planning

**Northern Worcester Transportation Study, Worcester County, MD** – Subconsultant to the RBA Group for a project to evaluate the transportation system (including automobile, transit, bicycle, and pedestrian) and transportation policies in the area to the west of Ocean City, MD. Performed a development capacity analysis that helped define trip generation rates, as inputs into a custom-built traffic model of the study area. Prepared land use policy recommendations that would help to achieve the desired future transportation conditions identified in the study.

**Rail Siting Study, Confidential Client** – As part of two separate but related studies, evaluated alternatives to increase fuel delivery capacity for a Midwest utility provider. Each study focused on a distinct portion of the utility’s service area. The project involved development of criteria and GIS/CAD mapping to identify and rank new and upgraded candidate rail alignments from multiple points of origin to multiple power plant destinations. The analysis also considered water-borne fuel deliveries separately and in conjunction with rail options.

**City of Buffalo Main Street Multi-Modal Access and Revitalization Project Environmental Assessment, Buffalo, NY** – Researched and wrote the Environmental Justice (EJ) section. This document helped the City and its partners (the Niagara Frontier Transportation Authority, Erie County, the New York State Department of Transportation, and Buffalo Place) evaluate options for restoring vehicular traffic to Main Street – currently reserved for pedestrians and a light rail transit system – in order to revitalize the downtown.

**Central Maryland Mobility Study** - Project Planner for this Maryland Department of Transportation (MDOT)-sponsored land use and transportation study that analyzed developable land, calculated development capacity, and created future development scenarios for a 600-square mile area that included portions of five counties, centered on I-95 between the Baltimore and Washington beltways. Responsible for data collection, analysis, and identification of land use and economic development trends within this important regional employment and population center.

**Northern Sub Area Study (NSAS), Atlanta, GA** - Project Planner for a scenario-building study for the Georgia Regional Transportation Authority (GRTA). The project generated alternative forecasts for the year 2025 for a number of land use and transportation scenarios. Responsible for the allocation of forecasts to sub-county areas based on various policy, regulatory and environmental conditions.

**Miami-Dade Transit, Miami, FL** – Planner for a 10-mile extension of Miami’s Metrorail system that would connect the Miami Intermodal Center (at Miami International Airport) with Florida International University. Analyzed demographic data and conducted field surveys to verify existing land uses, locate existing and potential future employment and activity centers, and identify any properties that could be adversely impacted by the proposed transit route.

**MetroSouth Alternatives Analysis and Draft EIS, St. Louis, MO** – Planner for a 10-mile extension of St. Louis’ Metrolink light rail system into southern St. Louis County. Responsible for land use and demographic analysis. Identified candidate alignments, station locations, and opportunities for development and redevelopment, with a focus on station-area development.

## Key Projects (cont.)

**Port Bienville Master Plan, Hancock County, MS** – Planner for an updated master plan for the port and its industrial park. Conducted interviews with existing tenants to evaluate existing road and rail transportation facilities and projected future transportation needs.

**Airport Landside Transportation Evaluations** – Transportation planner responsible for evaluating and making recommendations related to curb traffic, roadway system function, parking capacity and function, and other aspects of landside operations at major U.S. airports, including Denver International Airport, George Bush Intercontinental (Houston) Airport, and Minneapolis-St. Paul International Airport.

**Airport Consolidated Rental Car Facilities** – Transportation planner for several projects to define the siting, layout, and operational aspects of consolidated rental car facilities at major U.S. airports. Conducted on-site surveys of rental car agencies and meetings with airport officials and rental car agency representatives. Generated facility layouts. Specific projects included the CONRAC (under construction) at Hartsfield-Jackson Atlanta International Airport, the rental car facility at the Miami (FL) Intermodal Center (under construction), and a potential facility at Washington Dulles International Airport.

**Conceptual Layout, Daily Parking Garages, Charlotte-Douglas International Airport, Charlotte, NC** – Developed initial conceptual layout of the airport's new daily garages, including vehicular circulation to, from, and within the garages.

**Project Mapping, North and Northeast Corridors, Charlotte Area Transportation System (CATS), Charlotte, NC** – Developed land use maps and station-area maps, and conducted land use analysis in support of transit planning for CATS' North and Northeast corridors.

**American University Open Space Master Plan, Washington, DC** - Project Planner for the transportation portion of the Master Plan. Analyzed vehicular traffic volume, parking demand, and intersection operations, as well as pedestrian safety and facility demand.

### Impact Assessments

**Scenery Management (Visual) Assessment, White Pines Wind Power Project, Manistee National Forest, Michigan.** – Evaluated visual simulations of a proposed wind farm near

Manistee, Michigan. Used evaluation criteria based on the US Forest Service's Scenery Management System (SMS).

**Environmental, Social, and Health Impact Assessment (ESHIA), Confidential Client** – Researched and wrote an evaluation of the impacts of a large-scale natural gas development project in the western United States. Responsible for evaluations of impacts on land use, transportation, public infrastructure (including water and sewer service), and local services.

**Northeast Gateway Energy Bridge, Massachusetts Bay, Third-Party Environmental Impact Statement** - Working under direction of the U.S. Coast Guard, researched and wrote EIS sections pertaining to Land Use, Ocean Use, Transportation, Recreation, and Visual Resources. The proposed action would include construction of a deepwater port and pipeline lateral in Massachusetts Bay, to be used for the offload of Liquefied Natural Gas.

**Draft Environmental and Social Impact Assessment, New Providence Island, Bahamas** – Lead transportation planner for an Environmental and Social Impact Assessment (ESIA) for a planned resort on New Providence Island, The Bahamas. The project would include a new marina, housing, hotels, and an internal road network. Verified existing road conditions and planned road network improvements. Performed level of service (LOS) calculations for intersections, and managed traffic counts and modeling tasks to describe LOS for existing and future conditions. Conducted high-level consultations with planning and public works agencies to ensure governmental support for the ESIA.

**Offshore LNG Port and Pipeline Feasibility Assessment, Confidential Client** – Researched and wrote a feasibility analysis for construction of a deepwater port and pipeline near a major US City, to be used for the offload of Liquefied Natural Gas. Responsible for sections related to Land Use, Ocean Use, Transportation, Recreation, and Visual Resources.

**Preliminary Application Document for Hydropower Licensing, Massena, New York** – Conducted initial site reconnaissance, collected data, and wrote socio-economics and cultural resources sections in support of a new hydroelectric dam in upstate New York. The document identified existing

## Key Projects (cont.)

conditions and issues that require additional research and information.

**Condor Airspace Environmental Assessment, Maine and New Hampshire** – Researched and wrote the land use, socioeconomic resources, and cultural resources sections of this EA for the Air National Guard (ANG), which evaluated the potential impacts of combining two adjoining ANG airspaces, and lowering the operational floor of that airspace.

**Manassas National Battlefield Park Draft General Management Plan and Environmental Impact Statement, Manassas, VA** – Project planner and document editor. Revised the Draft GMP/EIS to reflect National Park Service and other federal and state agency comments. Responsible for preparation of all graphics and overall editorial control of this primary planning document for Manassas National Battlefield Park.

### Brownfields Planning

**Remedial Investigation and Feasibility Study, 68<sup>th</sup> Street Landfill Site, Rosedale, MD** – Project planner for the investigation and evaluation of cleanup options for a 270-acre study area, following USEPA's Superfund Alternative Site (SAS) process. Helped prepare the Land Re-Use section of the Sitewide Program Management Plan (SWPMP), and prepared project maps. Created the project logo.

**Republic Services, Socioeconomic and Demographic Assessment of Potential Landfill Sites, Person County, NC** – Collected and analyzed census data to determine the potential presence of Environmental Justice (EJ) populations near two potential solid waste landfill sites in North Carolina.

### Policy and Research

**World Bank City Performance Indicators Study** – Conducted research and prepared presentation materials and graphics. The study created a model to help cities throughout the world evaluate and improve their ability to meet the needs of their citizens. The model will be ground-tested in six cities: Vancouver and Toronto, Canada; Bogotá and Cali, Colombia; and Sao Paulo and Belo Horizonte, Brazil.

**Enlibra Workbook** – Collaborator and writer for two Workbook chapters. Enlibra and its associated Principles were created by the Western Governor's Association in the late 1990s in an effort

to re-envision environmental regulation, protection, and management in the United States. The Workbook is designed to give specific guidance on how to incorporate the Enlibra Principles into everyday environmental management decisions and practices.

**SMARTRAQ Project, Atlanta, GA** - Planner and Researcher for the Strategies for Metropolitan Atlanta's Regional Transportation and Air Quality (SMARTRAQ) research program, hosted at Georgia Tech. The project sought links between land use patterns, transportation behaviors, public health, and air quality, with the ultimate goal of reducing Atlanta's level of automobile dependence while promoting the economic, environmental, and personal health of the region and its residents.

**King County Smart Growth Initiative (SGI), Seattle, WA** - Project Planner for a study that linked land use patterns, transportation and travel behavior, physical activity, and public health. Developed a GIS database to link existing land uses with observed transportation and physical activity choices. Created and analyzed numerical measures of land use intensity, including residential density, intersection density, and land use mix. Three Seattle-area communities were chosen as test cases to examine the small-scale effects of land use policy changes.

# Dorothy Trippel

Staff Scientist



Dorothy Trippel is a Staff Scientist within ERM based in Scottsdale, Arizona. Ms. Trippel joined ERM in 2011, bringing 5 years of academic and operations/corporate industry experience in mining, chemicals, external relations, community development, socio-economic development, corporate community investment, group discussion facilitation and sustainability.

Ms. Trippel received her B.A. in Anthropology, Sociology, and Religious Studies from Kalamazoo College (K) in 2009. While at K, she focused on community development, globalization, corporate social responsibility (CSR), sustainable development and marketing in the mining industry, and Native American culture and religions. In fall of 2011, Ms. Trippel will begin an M.A. program in Sustainability at Arizona State University where she will focus on applying a dynamic systems framework to solving sustainability problems.

Ms. Trippel has found integrated solutions to social, environmental, and economic challenges at Kalamazoo College, Newmont Mining Corporation (Nevada Operations) and The Dow Chemical Company (Global Corporate EH&S and Sustainability Group). She has supported projects involving stakeholder mapping and analysis, community engagement and investing, water scarcity and biodiversity footprint mapping, sustainability strategy and marketing, and GRI sustainability reporting.

## Fields of Competence

- Sustainability strategy -operations and corporate
- Corporate Social Responsibility (CSR)
- Socio-economic development
- Stakeholder engagement
- Qualitative research methods

## Key Skills

- Stakeholder interviewing/ mapping
- WBCSD Water Tool mapping
- IBAT for Business biodiversity footprinting
- Group discussion facilitation

## Education and Training

- M.A. Sustainability, Arizona State University, United States, anticipated 2013
- B.A. Anthropology, Sociology and Religious Studies, Kalamazoo College, United States, 2009
- Certificate of Basic French Proficiency, Marc Bloch University, Strasbourg France, 2008
- 40-Hour MSHA surface, 2010

## Languages

- English, native speaker
- French, basic written and spoken proficiency

## Key Industry Sectors

- Mining
- Chemical

## Key Experience

### **Social Impact Assessment Follow-up, Newmont Mining Corporation - Nevada Operations, 2008-10.**

Developed process to follow up on socio-economic and environmental impacts of large-scale surface copper-gold mining construction through closure and reclamation, and a coal-fired power plant construction identified by ERM in a 2005 SIA. Interviewed stakeholders representing local government, business, community, ranching, Western Shoshone, contractors and employees. Synthesized stakeholder feedback into effective management recommendations to further improve community relations.

### **Newmont Legacy Fund, Newmont Mining Corporation - Nevada Operations, 2010.**

Supported inter-departmental team at Newmont in research and design of a Legacy Fund to establish vehicle for sustainable community investment. Teamed with External Relations Representatives to brand and roll out Legacy Fund to internal and external stakeholders. Coordinated with University of Nevada, Reno to create a non-profit management training seminar for key Newmont employees.

### **Global Water Stress and Scarcity Mapping, The Dow Chemical Company - Corporate EH&S/Sustainability Group 2010.**

Mapped current and projected water stress and scarcity in proximity to global operation sites using *The World Business Council for Sustainable Development (WBCSD) Water Tool* in order to provide data for the Sustainable Chemistry Index - a Life Cycle Assessment tool measuring progress towards Dow's 2015 Sustainability Goals.

### **Global Biodiversity Indicator Mapping, The Dow Chemical Company - Corporate EH&S/Sustainability Group, 2010.**

Tested *Integrated Biodiversity Assessment Tool (IBAT) for Business* to map key biodiversity indicators in proximity to global operations in order to identify biodiversity footprint and support the development

and implementation of Dow's global biodiversity strategy.

### **Global Reporting Initiative (GRI) Report, The Dow Chemical Company - Corporate EH&S/Sustainability Group, 2010.**

Reviewed Dow GRI reports and industry marketing trends to provide recommendations to improve navigability and increase readership of 2009 report. Authored integrated table of contents, co-authored Biodiversity Aspect.

### **Community Investment Sustainability Assessment, Newmont Mining Corporation - Nevada Operations, 2009.**

Analyzed four Newmont community investment committees in Northern Nevada and the long-term socio-economic impacts of their investments. Identified strengths and weaknesses in application format, review process, and program marketing and led group discussions on opportunities for improvement.

### **Corporate Social Responsibility (CSR) and Mining Senior Thesis, Kalamazoo College, 2009.**

Developed and conducted library research project analyzing CSR's history, definition, management theory, business case, ethics and role in sustainable development efforts in the mining industry. Outlined future research to expand literature on CSR, document community perspectives on mining impacts and promote collaboration between industry, academia and community.

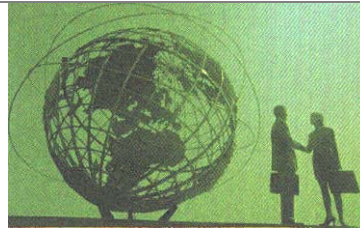
### **Asset Based Community Development Project, Kalamazoo Eastside Neighborhood Association, 2007.**

Teamed with residents, faculty and peers to design development project. Conducted door-to-door capacity inventories of residents' skills and resources. Compiled oral histories of the neighborhood. Coded and analyzed qualitative data using ATLAS.ti to identify development opportunities. Organized and facilitated community forum to share findings and engage residents.



# Jason Willey

Aquatic Ecologist



Mr. Willey has approximately eleven years experience in ecology and natural resource management with specific expertise in aquatic ecology and assessing the environmental impacts of hydropower developments. He has ten years experience in Environmental Impact Assessment, has managed several impact assessment projects over his tenure at ERM, and has made significant technical contributions to many others. Mr. Willey is a skilled field biologist, and has performed aquatic biological impact assessments in North America, Asia, South America, Europe, and Africa. He is well versed in family-level macroinvertebrate diversity indices, the US EPA's Rapid Bioassessment Protocols, and various fisheries assessment techniques.

## Fields of Competence

- Environmental and Social Impact Assessment, to NEPA (USA) and international standards
- Aquatic and estuarine ecology, including quantitative and qualitative fish community survey methods (US EPA rapid bioassessment protocol), Essential Fish Habitat evaluation, aquatic macroinvertebrate ecology, water quality sampling, and in-stream macrohabitat assessment
- Terrestrial ecology, including application of Habitat Suitability Indices (HSIs), Forest Stand Delineations, Riparian Habitat Evaluation, and wetland reconnaissance and delineation
- Aerial photograph, landscape feature, and habitat interpretation
- Wetland delineation and functional assessment

## Education

- B.S., Biology, University of Richmond, Richmond, VA, May 1997
- M.S. Environmental Science and Policy, Johns Hopkins University, May 2007

Language  
English

## Key Projects

**Suralco (Alcoa Suriname).** Lead aquatic ecologist on a feasibility assessment for a bauxite mine at a greenfield site in central Suriname. Historical investigations documented several species of armored catfish at the site, including at least one species that was potentially

endemic to the local watershed immediately surrounding the proposed development site. We have discovered new populations of one highly endemic species, at least one species new to science, and another species that previously been suspected to be extinct. Partnering with Auburn University researchers to substantiate our discoveries with molecular phylogenetic analyses. Currently preparing the impact assessment, mitigation plan, and monitoring plan focusing on preserving the rare fish on the plateau.

**Staatsolie (ongoing).** Aquatic biological technical lead on the ESIA for Staatsolie's proposed Sugarcane-to-Ethanol Plant in Wageningen. Project is in its initial stages, but tasks will include review and compilation of existing aquatic biological data in the affected area, leading/supervising field studies as necessary, and preparing the relevant ESIA sections. One of the key issues to be addressed in the ESIA will be water use (given the high demand for water in the production of sugarcane), water quality, and associated impacts on aquatic biota.

**Suralco.** Assisted with the terrestrial biological portion of the ESHIA related to a proposed expansion of Alcoa's aluminium refinery in northeastern Suriname. Assisted other ERM staff with the planning for a rapid assessment biodiversity survey of the undeveloped area surrounding the refinery. The results of the RAP survey were used to evaluate the impact of the proposed refinery expansion on local ecology and to recommend ways to minimize adverse effects sensitive habitats and species.

**Alcoa (ongoing).** Preparing an EIA for an aluminum smelting project in southwest Greenland to include a two hydroelectric developments and electric transmission lines. Issues of concern related to construction of the hydropower developments include potential ecological impacts of freshwater discharges to near shore marine habitats as well as impacts on anadromous and resident Arctic char. Issues of concern related to the transmission lines include potential restriction of access to inshore fishing areas and interference with bird flight patterns.

**Rohas Euco.** Prepared the fisheries and aquatics resources impact assessment as part of the ESHIA for the proposed 60 MW Nam Sane 3 Hydroelectric Project in Ban Phouviang, Xieng Khouang Province, Lao PDR. Conducted field assessments of aquatic habitat, fisheries and aquaculture practices, and general aquatic ecology.

Overcame potential safety hazards from unexploded ordinance that prevented in-water surveys by interviewing local and indigenous people concerning fish distributions, migrations, and habitat use, as well as extrapolating from existing fisheries data from elsewhere in the Mekong River Basin.

**International Joint Commission (US and Canada).**

Managed a project to evaluate the potential effects of peaking ponding by hydropower interests on the ecology of the St. Mary's River. Consulted with the federal, state, and provincial agency personnel with regulatory responsibility on the river to evaluate the agency's concerns relative to peaking and ponding. Prepared an assessment for the IJC of peaking and ponding's effects on biological resources of concern, including migratory fish, the threatened lake sturgeon (*Acipenser brevirostrum*), and nuisance species, including the catadromous sea lamprey (*Petromyzon marinus*).

**Bui Hydroelectric Project.** Performed the aquatic resources and fisheries impact assessment for the Bui Hydroelectric Project on the Black Volta River in western Ghana. Key aquatic issues included conversion of riverine habitat to lacustrine habitat, loss of riparian productivity, and migration barriers.

**Hydro SRL.** Authored the aquatic resources and fisheries section of the EIA for the planned 100 MW Kalivac Hydro Power Plant on the Vjose River in Southern Albania. Determined that the project had the potential to fragment populations of resident and migratory fish species, including the several IUCN-listed minnows, two salmonids, and two species of sturgeon. Concluded that the project had the potential to enhance fisheries upstream of the dam due to increased productivity in the impounded reach. Recommended monitoring for indications of barotrauma and/or congregations of migratory fish downstream of the dam.

**Massena Electric Department.** Prepared aquatic resources section of the Preliminary Application Document submitted to FERC for a small (<10 MW) municipal hydropower project on the Grasse River in Massena, NY. Scoped initial aquatic ecological and fisheries studies required for the environmental impact analysis. Supervised riparian habitat mapping surveys and a wetland delineation along approximately 8 miles of the Grasse River. Developed conceptual designs for fish passage facilities designed to pass lake sturgeon and American eel. Assessed the potential impacts to local traditional fisheries practiced by the Mohawk Native American tribe.

**Federal Energy Regulatory Commission (US).**

Determined the effects of the proposed relicensing of

Portland General Electric's 173-MW Clackamas River Hydroelectric Project on fish and aquatic species on the Clackamas River in Oregon. Evaluated the current and potential future effects of the hydroelectric facility on fish and aquatic species, including several species of threatened or endangered salmonids. Authored the Threatened and Endangered Species section of the EIS for the project, which compared the effects of the proposed action and agency alternative on listed salmonids, native fish species, and benthic macroinvertebrates.

**New York Power Authority.** Co-authored the fisheries and aquatics resources section of the EIS for relicensing NYPA's 912 MW St. Lawrence-FDR Power Project on the St. Lawrence River in northern New York (US). Assessed the potential effects of relicensing the hydroelectric project on fish and aquatic species, including several species of threatened or endangered fish, macroinvertebrates, and plankton. Considered potential effects on rare warm-water habitats created by the project and their role in enhancing fish reproduction in the river. Considered fish passage design and protective measures to avoid loss of fish passing downstream via the spillway and/or the turbines.

**Maryland Department of Natural Resources.**

Managed an update to the Recreational Boating Management Plan for Deep Creek Lake, a hydropower facility in Western Maryland and the largest lake the state of Maryland (US). Managed an intensive sampling effort to characterize the effect of recreational use of the lake. Worked closely with commercial rental marina operators to develop a comprehensive inventory of the available recreational rental fleet at the lake. Interviewed each rental marina operator, reviewed business records for the 2003 rental season, and tracked recent trends in commercial use to evaluate the effect of commercial use in the lake's buffer strip. Determined that the lake had the potential to experience peak use on any weekend with good weather during the summer. Made several recommendations to the DNR and the PRB for managing increased commercial and recreational use of the lake.

**Virginia Department of Game and Inland Fisheries.**

Sampled fish communities in several major drainages throughout Virginia (US). Collected historical data and developed a database of historical fish collections throughout the state organized by watershed. Compiled data and prepared reports on watershed health based on recent and historical qualitative and quantitative fish data. Standardized stream data collection procedures in preparation for the eventual development of a statewide fish Index of Biotic Integrity in Virginia.

# Sarah S. Piper



Ms. Sarah Piper has 9 years of diverse experience in biological assessment work, environmental assessment of chemically impacted sites and environmental compliance. She has conducted several ecological risk assessments, wetland delineations, biological assessments and threatened and endangered species surveys. Ms. Piper is the west coast lead for avian inspections and surveys for a telecommunications client. Additionally, she has conducted investigations of soil, ground, and surface water contamination for projects associated with mines, manufacturing facilities, military bases, construction sites, and other industrial facilities.

Ms. Piper has worked on environmental investigations at several closed mine sites. She has conducted stormwater monitoring, groundwater sampling, and ecological sampling at Sulphur bank Mercury Mine. Additionally, she has conducted characterizations for several former hydraulic gold mines and mercury mines in the Sierra foothills and coast range.

Ms. Piper has performed environmental compliance for industries in several states, including California, Nevada, Oregon, Washington, and Alaska. She conducted over 150 Phase I environmental site assessments (ESA) for a variety of clients, including a national homebuilder, Bay Area redevelopment agency, and state agencies. She has acted as an on-site hazardous waste and materials coordinator, and is familiar with regulations for hazardous wastes as well as has general knowledge of other compliance regulations.

Ms. Piper has worked in remote locations and used a variety of methods to access sites and collect samples. She has mountain-biked and backpacked into mining sites, kayaked into lakes and wetlands, and driven all-terrain vehicles into sites. For sample collection, she has rappelled into mine shafts for soil and water, collected water measurements, biota, and sediments from a kayak, and operated an electro-shocking boat for fish collection.

## Fields of Competence

- Wetland delineations
- Biological assessments
- Ecological Risk Assessment
- Threatened and Endangered species surveys
- Mine assessment and closure
- Regulatory compliance
- Compliance, including facility audits and ESAs
- Storm water monitoring programs
- Soil and ground water investigation
- Monitoring well installation
- Ground water monitoring programs
- Soil and ground water sampling techniques

## Education

- B.A., Biological Sciences, Pace University, New York, 2000
- 40-hour OSHA HAZWOPER, 2001
- 8-hour OSHA HAZWOPER Refresher, current
- 16 hour Wilderness First Aid, CPR, current
- Swift water Rescue Technician, current

## Key Industry Sectors

- Aerospace
- Chemical
- Government
- Manufacturing
- Mining & Extractive
- Transportation
- Waste Management Services



## Key Projects

### **Mine Characterization and Wetland Delineation, Sulphur Creek Mining District, Homestake Mining, 2009-present. Technical Team Lead**

Assisted with design of conceptual site model and a data gap analysis for the Central Mine Group (5 mines) and Wide Awake Mine. Designed a work plan to conduct the characterization of the mines for a clean-up and removal action. Conducted sampling and mapping of mine waste. Additionally, conducted several wetland delineations and Waters of the US determinations for the mine sites. Created habitat restoration/revegetation plan for the mine sites in anticipation of remediation. Wrote a biological assessment for the mine sites and surrounding area. Currently analyzing the data for mine waste removal planning.

### **Wetland Delineations, California, Utah, and Nevada, 2000-2011. Delineator/Assessor**

Performed wetland delineations in various habitat types including forest, desert, foothill chaparral, and urban environments. Submitted reports to the US Army Corp of Engineers for approval.

### **Biological Assessments, California, Washington, Utah, and Nevada, 2000-2011. Biologist.**

Completed general biological surveys for nationwide homebuilder and several private clients to assess biological resources at various sites. Conducted threatened and endangered (T&E) species surveys for various private clients for several species of flora and fauna; this included surveys for habitat as well as specific species surveys.

### **Ecological Investigation, Suriname, South America, 2010. Biologist.**

Conducted surveys of several creeks at the Nassau Plateau. Collected water quality measurements, documented habitat conditions, and captured fish and invertebrates for DNA analysis.

### **Avian Surveys, California, 2010-present. Biologist.**

Ms. Piper has been designated as the west coast lead for avian inspections and surveys for a national telecommunications client. Ms. Piper is "on call" for travelling to cell phone towers where potentially active nests have been observed. She inspects the nest and surveys the area to determine the type of bird, whether the nest is occupied, and determines an action plan for timeframe for work to be conducted near the nest.

### **Emergency Response, MC252 Oil Spill, Gulf of Mexico, BP, 2010. Technical Team Lead.**

Assisted with environmental decontamination team in the planning group during oil clean-up activities. Acted as deputy of the environmental decontamination team for a portion of the response effort. Co-authored the liquid and solid waste management plans, and on- and near-shore decontamination plans. Conducted regulatory compliance audits for all BP sites in Mississippi. Assisted with coordination of shipping, receiving, and storage of oily waste at Waste Management facilities. Conducted inspections of on-shore decontamination facilities in Florida and Alabama.

### **Ecological Risk Assessment, Holden Mine, Private Client, 2008-2009. Technical Team Lead**

Assisted with design of work plan to conduct an ecological assessment at 20 different areas of interest including tailings piles, windblown tailings, and waste rock piles. Collaborated with US Forest Service representatives on work plan and sample location selection. Acted as on-site coordinator for field crew of 9 people during implementation of the work plan; this included collection of surface and deep soils, plants, and soil invertebrates. Analyzed the data and wrote the Risk Assessment report.

### **Ecological Risk Assessment, George Air Force Base, California, US Military, 2010. Risk Assessor**

Conducted the site reconnaissance and biological assessment of the site to determine receptors and exposure pathways. Assisted with the risk assessment and provided final technical review of the report.

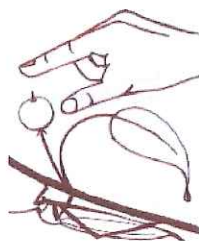
### **Burrowing Owl Monitoring, Henderson, NV, Private Client, 2008. Technical Team Lead**

Assisted with design of burrowing owl survey at a contaminated landfill. Conducted survey and identified active and potential burrow sites. Conducted a second confirmation survey, cleared and collapsed empty burrows to encourage the owls to vacate from the site.

### **Site Investigation, Alpha Diggins, Omega Diggins, and Relief Hill Mines, US Forest Service, 2005-2007. Technical Team Lead**

Conducted exploratory investigations at all three mines to determine mine features including inlet and outlet portals, collapsed shafts, settling ponds and high walls. Sampled soils, surface water, and rain water to determine potential mercury contamination.

## Curriculum Vitae (CV – Resume) Bart De Dijn



**Bart De Dyn**  
*environmental  
consultancy*



F. name: **Bart**      Other initials: **P. E.**      L. name: **De Dijn**  
 Nationality: **Belgian (B)**      Born in **Hasselt (B) 16 june 1966**  
 Civil status: **divorced, no children**  
 Residence: **Suriname, Paramaribo, Manbarklakstr. 27**  
 Phone:      [00] **(597) 8153509**      email: [bartdedijn@ess-environment.com](mailto:bartdedijn@ess-environment.com)  
    [dedijn@yahoo.com](mailto:dedijn@yahoo.com)

### PROFESSIONAL INTERESTS

- Tropical Environment, Ecology and Biodiversity
- Biodiversity Conservation in the Tropics
- Uses of and Impacts on Amazonian Ecosystems
- Development using Biological Resources, incl. Tourism
- Institutional and Human Resource Development
- International Networking, Cooperation and Fundraising



### PROFESSIONAL / EMPLOYMENT HISTORY

<i>Inclusive dates</i>	<i>Institution</i>	<i>Position</i>
2005-present	Environmental Services & Support** consultancy	associate - expert
2004-present	Bart De Dyn* environmental consultancy	owner - director
2001-2004	Fdtn. Nature Cons. Suriname (Stinasu)	research director
1999-2001	Fdtn. Nature Cons. Suriname (Stinasu)	research coordinator
1996-2001	National Zoological Collection at University Suriname	researcher - lecturer
1990-1996	National Zoological Collection and Env. Res. Center at University Suriname	lecturer - curator
1989-1990	Agric. Exp. Station Merelbeke (Belgium)	trainee (research)

\*\* registered at the Suriname Chamber of Commerce (KKF) since 2005; registration no. 42861

\* registered at the Suriname Chamber of Commerce (KKF) since 2004; registration no. 41303

**EDUCATION**

<b>Degree, Original title</b>	<b>Degree, intl. equivalent</b>	<b>Year degree received</b>	<b>Discipline</b>	<b>University</b>
Licentiaat	MSc	1988	Zoology	Ghent State University (Belgium)
Kandidaat	BSc	1986	Biology	Limburg University Center (Belgium)

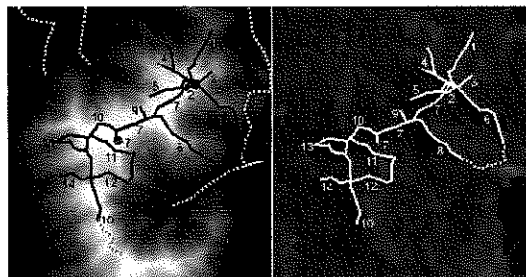
**LANGUAGE SKILLS**

<b>Language</b>	<b>Written, passive</b>	<b>Written, Active</b>	<b>Spoken, Passive</b>	<b>Spoken, Active</b>
Dutch	excellent	excellent	excellent	excellent
English (USA)	very good	good	very good	good
French	good	fair-good	good	fair-good
German	good	poor-fair	good	fair
Surinamese (standard)	good	poor-fair	good	fair-good*
Okanisi Surinamese	poor-fair	very poor	poor-fair*	very poor*
Italian	fair-good	poor	fair*	poor*
Portuguese (Brazilian)	fair-good	poor	fair*	poor*
Spanish	fair-good	poor	fair*	poor*

\* my spoken skills tend to improve substantially when "immersed" in these languages for a while

**COMPUTER SKILLS**

<b>Software</b>	<b>Skill level</b>
Windows OS, incl. Office Suite	good
SPSS (statistical analysis)	good
Corel (Draw and Paint)	good
Arcview / ArcGIS (and other GIS utilities)	fair
Basic and Pascal (DOS OS)	good



**PARTICIPATION IN THE FOLLOWING JOBS (commercial; 2000 onwards)**

<b><i>Inclusive dates</i></b>	<b><i>Title or purpose of intervention</i></b>	<b><i>Client</i></b>
2010-present	Baseline and impact specialist studies Nassau bauxite mine (Suriname)	ERM (USA) for Surlaco / ALCOA
2010-present	Design of National Biodiversity Information System for Suriname (phase I)	GISsat (Suriname) for Min. ATM (Suriname Government)
2010-present	Finalization Suriname National Biodiversity Action Plan (phase II)	Min. RGB (Suriname Government)
2010-present	Assess Suriname environm. management framework in Chaguaramas Treaty context	Caribinvest (TT) for CARICOM
2010-11	Development of business plan for the Central Suriname Nature Reserve	TAH (Suriname) for Min. RGB (Suriname Government)
2010	Preliminary baseline and impact assessment Pokigron-Pusugrunu road (Suriname)	Prosur (Suriname) for Min. PLOS (Suriname Government)
2010	Quick scan of suitability of concessions for sustainable oil palm	KIT (Royal Institute for the Tropics in Holland)
2009	Drafting of preparatory documents for GEF project on Coastal Protected Areas	Min. RGB (Suriname Government)
2009	Drafting 3 <sup>rd</sup> Suriname National Report UN Convention Biological Diversity	Min. ATM (Suriname Government)
2008-9	Ecological Baseline Assessment Services Nassau Transport Corridor	ERM (USA) for Suralco / ALCOA
2008-9	Assessment of conservation training and education in Suriname	Organization Tropical Studies (OTS)
2008	Thematic Assessment as part of Capacity Self-Assessment of Suriname	Min. ATM and PLOS (Suriname Government)
2007	National Biodiversity Action Plan Suriname, phase I of development	NIMOS (Suriname Government)
2007	Country Study for Regional Management of Biodiversity	ACTO / I(A)DB
2007	Terrestrial Ecology Study as part of Bakhuis Transport Project ESIA	SRK (South Africa) for BHP Billiton
2007	assistance with drafting of Strategic Environmental Assessment Suriname	Sunecon / Royal Haskoning for I(A)DB
2006-7	assistance with development TSP Capacity Building Strategy	Tropenbos Suriname (TSP)
2006	Biotrade Assessment Suriname	ACTO / UNCTAD
2006	Review of Management Plan Sipaliwini Nature Reserve (Suriname)	Conservation International
2006	TSP Program Development description	Tropenbos Suriname (TSP)
2006-7	Brownsberg Biodiversity review	Conservation International
2005-	Baseline study terrestrial invertebrates	SRK (SA) for BHP Billiton

<b><i>Inclusive dates</i></b>	<b><i>Title or purpose of intervention</i></b>	<b><i>Client</i></b>
ongoing	Bakhuis Concession (Suriname)	
2005-2006	Scoping Study Okanisi tribal land on the Tapanahony (Suriname)	Okanisi Sidon Libie, Bureau Forum NGOs and NC-IUCN
2005	Rapid habitat mapping Bakhuis Concession (Suriname), assistance	SRK (SA) for BHP Billiton
2005	Rapid Botanical Inventory Tafelberg	University of Suriname
2004-2005	Ecoregional Vision development, assistance w.r.t. Focal Species	WWF Guianas
2004	TSP Conservation Options assessment	Tropenbos Suriname (TSP)

**GRANTS RECENTLY AWARDED (not commercial; 2000 onwards)***based on projects personally developed and coordinated:*

<b>Inclusive dates</b>	<b>Project title or purpose</b>	<b>Grantee (institute)</b>	<b>Granting agency</b>	<b>Amount granted</b>
2002-2005	Ecological Monitoring at Brownsberg Nature Park	Stinasu	WWF-Guianas	110,000 US \$
2003-2005	Multimedia Tool to Monitor Health of Forest Ecosystem	Stinasu	Potowatomi Zoo (USA)	4,200 US \$
2002-2004	Monitoring and Conservation Marine Turtles in Suriname	Stinasu	WWF-Guianas	180,000 US \$
2000-2002	Logging Impact on Biodiversity at Kabo (West Suriname)	University Suriname	WWF-Guianas	41,500 US \$

*based on assistance with project preparation and writing:*

<b>Inclusive dates</b>	<b>Short project title or purpose</b>	<b>Grantee (institute)</b>	<b>Granting agency</b>	<b>Amount granted</b>
2007-2008	Orchid & Bee Inventory of the Lely range (Suriname)	Suriname Herbarium	Suralco LLC	6,000 US \$
2005-2006	Scoping study setup mgt. structure Okanisi territory	Okanisi Sidon Libie	NC-IUCN	10,000 Euro
2005-2008	Training "Capacity Building Suriname Forest Sector"	Platform Houtsector	Tropenbos & WWF Guianas	31,400 US \$
2004-ongoing	Capacity building Suriname Conservation Fdtn. (SCF)	SCF and others	DGIS/GEF via UNDP	3,600,000 US \$
2003-2006	Park and Community Development at Brownsberg-Brownsweg	Caribbean Cons. Ass. / Stinasu	EU via Caribb. Region. Env. Program	600,000 Euro
2000-2002	Support for Bird Conservation in Suriname	Stinasu	Dutch Embassy	16,000 US \$

**TERRESTRIAL ECOLOGY SPECIALIST STUDY**

as part of the

**ENVIRONMENTAL SOCIAL IMPACT ASSESSMENT  
OF THE PROPOSED TRANSPORT PROJECT  
FOR THE BAKHUIS MINING OPERATIONS  
(SURINAME, SOUTH AMERICA)**



## FIELD RESEARCH EXPERIENCE

- 2005-present as **environmental consultant** in Suriname: ecological baseline assessment of Nassau area, biophysical baseline assessment of the lower Tapanahony area, botanical assessment of Tafelberg, habitat and terrestrial invertebrates assessment of Bakhuis, overall terrestrial ecology assessment in West Suriname, as well as study of orchid bees at various locations (also in French Guiana);
- 1999-2004 as **coordinator of nature and conservation research** in Suriname, in relation to e.g. Brownsberg Park and Central Suriname, Cusewijne and Sipaliwini Nature Reserves (as well as the Lely and Kaburi areas);
- 1994-2002 as **researcher and research coordinator** of forest ecology projects at Akintosula and Kabo (both in Suriname);
- 1991-1998 as **invertebrate animals expert** participating in biological expeditions in Suriname, e.g. to the Tapanahony, Palumeu, Cusewijne, Lawa-Ulemari; and
- 1990-1999 as **entomology researcher** at various locations in Suriname (e.g. coastal plain, savanna belt, northern part of Shield; incl. Bigi Poika, Apura-Washabo, Perica-Mungo, and Nassau) and in Trinidad (Northern Range).

## OTHER PROFESSIONAL EXPERIENCE

- **as co-developer / writer of donor-funded projects** (for implementation in Suriname; since 2000, cf. Grants) on forest management and conservation (small projects for various local agencies) capacity building for conservation (for Forest Service and Stinasu), and park and community development (for CBOs);
- **as developer / coordinator of donor-funded projects** (for implementation in Suriname; since 1994, cf. Grants) on park research and development (at Brownsberg), marine turtle conservation (at Galibi), and logging impacts on biodiversity (at Kabo and Akintosula);
- **as co-organizer / promoter of annual global meeting** of the Association for Tropical Biology & Conservation (ATBC), held in Suriname in June 2008;
- **as (co-)organizer of national workshops** on National Biodiversity Action Plan (2007), on Regional Biodiversity Management and on Biotrade (2007)

and 2006), on Logging Impacts on Biodiversity (2001), and on Protected Areas Prioritization (1997); all workshops in relation to, and held in Suriname;

- **as contributor to National Strategic Plans:** National Biodiversity Action Plan (in prep.) and Strategy of Suriname (first draft; 1995-6) and National Environmental Action Plan of Suriname (1997);
- **as participant at global meetings on nature conservation and research** (in Malaysia 1999, Paraguay 2003, South Africa 2003, USA 2004, and Mexico 2007), incl. last IUCN World Parks Congress (Durban, SA) and ATBC meetings;
- **as participant at regional and national meetings on biodiversity, forestry, tourism and nature conservation**, e.g. recently on Conservation Planning (Georgetown 2005), Forestry (Georgetown 2001), Marine Turtles (Cayenne 2002) and Non-Urban Environmental Policy (Paramaribo 2004); and
- **as participant at regional and global meetings on bee research and apiculture** (in Switzerland 1992, Costa Rica and Cuba 1996) **and on taxonomic network development** (Trinidad 1997 and UK 1995 & 1999).

## RECENT PUBLICATIONS (2000 onwards)

consultancy reports resulting from contracts awarded (see above) are not listed here, since they have not been published, and are not in the public domain

De Dijn, B.P.E. and D.W. Roubik (in prep.).  
Euglossine bee functional diversity.



Schmidt, P., B.P.E. De Dijn, W.B.J. Jonkers, and P. Ketner (in prep.). Species composition and forest structure. In: **The CELOS Management System: CMS Principles, Implementation, Results and Experiences so far.** Mohren, G.M.J, and R. van Kanten (eds.).

Hammond, D.S., V. Gond, B. de Thoisy, P.-M. Forget, and B.P.E. De Dijn. 2007. **Causes and Consequences of a Tropical Forest Gold Rush in the Guiana Shield, South America.** *Ambio* 36(8): 661-670.

De Dijn, B.P.E., I.E. Molgo, M.A. Norconk, L.T. Gregory, B. O'Shea, C. Marty, M. Luger, M. Ringler, S. Crothers IV, B. Noonan, K. Fitzgerald, S. Mitro, A. Vreedzaam, and D. Satyawan. 2007. **Biodiversity of the Brownsberg.** In: *A Rapid Biological Assessment of the Lely and Nassau Plateaus, Suriname*



(with additional information on the Brownsberg Plateau). Alonso, L.E. and J.H. Mol (eds). CABS, Conservation International, Washington, D.C.

Molgo, I.E. and B.P.E. De Dijn. 2007. **Orchids and Orchid Bees of the Brownsberg, Nassau and Lely ranges**. In: *A Rapid Biological Assessment of the Lely and Nassau Plateaus, Suriname (with additional information on the Brownsberg Plateau)*. Alonso, L.E. and J.H. Mol (eds). CABS, Conservation International, Washington, D.C.

De Dijn, B.P.E. 2005. **Flower-visiting Insects in Guianan Forests: Pollinators, Thieves, Lovers and their Foes**. In: *Tropical Forests of the Guiana Shield*. Hammond, D.S. (ed). CABI Publishing, Wallingford, UK & Cambridge, USA: 321-342.

Norconk, M.A., M.A. Raghanti, S.K. Martin, B.W. Grafton, L.T. Gregory, and B.P.E. De Dijn. 2003. **Primates of Brownsberg Natuurpark, with particular attention to the Pitheciins**. *Neotropical Primates* 11(2): 94-100.

De Dijn, B.P.E. 2003. **Vertical Stratification of Flying Insects in a Suriname lowland rainforest**. In: *Arthropods of Tropical Forests*. Basset, Y., V. Novotny, S.E. Miller, and R.L. Kitching (eds). Cambridge University Press, Cambridge, UK: 110-122.

Fitzgerald, K.E., B.P.E De Dijn, and S. Mitro. 2002. **Brownsberg Nature Park Ecological Research & Monitoring Program 2001-2006**. Stinasu, Paramaribo, Suriname; available digitally from authors.

## REFEREES

### *Local (Suriname)*

- **Gerold Zondervan**, senior officer at WWF Guianas [gzondervan@wwf.sr](mailto:gzondervan@wwf.sr)
- **Paul Ouboter**, head NZCS at University of Suriname [p.ouboter@uvs.edu](mailto:p.ouboter@uvs.edu)
- **Sietze van Dijk**, capacity building officer at Tropenbos Suriname [cbo.tbisur@yahoo.com](mailto:cbo.tbisur@yahoo.com)

### *International*

- **Kate Steyn**, senior project manager at SRK (SA) [ksteyn@srk.co.za](mailto:ksteyn@srk.co.za)
  - **Maartje Hilterman**, senior staff at NC-IUCN [maartje.hilterman@iucn.nl](mailto:maartje.hilterman@iucn.nl)
  - **Pierre-Michel Forget**, forest ecology research director at Museum National d'Histoire Naturelle (Paris) [pmforget@yahoo.fr](mailto:pmforget@yahoo.fr)
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# CURRICULUM VITAE

## Personalia

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Family name	de Wolf
First name	Rutger
Residence	Paramaribo, Suriname
Date of birth	30-04-1980
Place of birth	Drachten, The Netherlands
Gender	Male
Nationality	Dutch
Civil status	Married

## Education

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<b>1999 – 2006</b>	MSc Forest and Nature Conservation Wageningen University, Wageningen, The Netherlands Main subjects: community & social forestry, sustainable forestry and certification
May – Dec 2003	Master Thesis 1: <i>Natural areas for livelihood improvement of local communities in Romania (Piatra Craiului National Park)</i> , socio-economic research, supervised by Ir. M.A. Hoogstra MTD KNNV (Royal Dutch Society for Nature Conservation), Netherlands and ICAS-Bucharest (Forest Research and Management Institute), Romania
Oct 2004 – Jun 2005	Master Thesis 2: <i>Internal transaction costs of indigenous community forest enterprises in TCO Tacana, Bolivia</i> , socio-economic research, supervised by Ir. C.E.B. Benneker and Dr. Ir. K.F. Wiersum Wageningen University and Research, Wageningen, The Netherlands and Bolivia
Aug – Dec 2005	Internship: Junior consultant concerning sustainable forest management and certification, legality of timber and occupational safety and health, supervised by S. van Dijk MSc. Stichting Erkend Groen, Wageningen, The Netherlands
<b>May – Dec 2003</b>	Socio-economic research, title research: <i>Natural areas for livelihood improvement of local communities in Romania (Piatra Craiului National Park)</i> ;
<b>1998 – 1999</b>	EH-basic year Evangelical High School, Amersfoort, The Netherlands Main subjects: Philosophy, general writing / didactical / communication skills
<b>1992 – 1998</b>	VWO, secondary school Reformed Comprehensive School Guido de Brès, Amersfoort, The Netherlands

## Short Courses

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<b>Feb 2008</b>	Forest Inventory and Data Processing Centre for Development of Enterprises (EU), Paramaribo, Suriname
<b>Oct 2010</b>	Editorial training for journals Schrijversvakschool, Paramaribo, Suriname
<b>Jan 2011</b>	Modeling Environmental Dynamics (e.g. deforestation) with Dinamica Ego Federal University of Minas Gerais (Brazil), Paramaribo, Suriname
<b>Mar 2011</b>	Long-range Energy Alternatives Planning System (LEAP) – modelling tool Stockholm Environment Institute (USA), Paramaribo, Suriname

## Employment Record

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- Mar 2011 – present** Environmental Services & Support N.V., Paramaribo, Suriname - fulltime  
For consultancy, technical assistance, training, research and project management regarding sustainable management and utilization of forest and nature (in Suriname).  
*Associate consultant*
- July 2007 – Mar 2011** Environmental Services & Support N.V., Paramaribo, Suriname - fulltime  
For consultancy, technical assistance, training, research and project management regarding sustainable management and utilization of forest and nature (in Suriname).  
*Consultant and office manager*
- Feb 2006 – June 2007** Stichting Erkend Groen, Wageningen, The Netherlands - fulltime  
For consultancy, technical assistance, education, research, project management and control on improved quality of work, occupational safety and health and environmental issues in agriculture, forestry, nature conservation and environment related sectors in The Netherlands and in Suriname.  
*Junior consultant*
- Aug 2000 – Mar 2002** OHRA Zorgverzekeraar (Health Insurer), Arnhem, The Netherlands - part-time  
*Administrative employee*

## Short Missions

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- Sep - Oct 2006** Platform Houtsector Suriname, Paramaribo, Suriname  
Elaborating documents, conducting interviews with stakeholders and training the sector concerning legality of timber.

## Professional Experience

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- July 2007 – present** **Suriname (Environmental Services & Support)**
- General management, workflow management, budgeting and control
  - Project planning, report writing and proposals for funding
  - Project implementation and management
  - Writing of advisory documents, both for governmental and profit organisations, on environmental policy and sustainable management
- Actively involved in e.g. the following assignments:
- Nassau Ecological Baseline Studies, fieldwork, reporting, project logistics, management and co-editor on flora & habitat analyses; for ERM (USA), 2010
  - Feasibility Study for Oil Palm Plantations in Eastern Suriname, reporting (co-editor); for the Royal Tropical Institute (KIT, NL), 2010
  - Mitigation Assessment for Second National Communication to the UNFCCC, stakeholders consultation and reporting on forests and forestry (main editor), 2010-ongoing
  - Forest Exploitation and Business plans, planning and mapping of forest exploitation activities (main editor); for two concessionaires, 2009-2010
  - Quarterly Specialist Journal on Forest & Nature, editor and manager; for the Centre for Agricultural Research in Suriname (CELOS), 2009-ongoing
  - Preparation of the Third National Report for UN Convention on Biological Diversity, stakeholders consultations and reporting (co-editor); for the Ministry of Labour, Technological Development and Environment (ATM), 2009
  - National Capacity Self Assessment (NCSA): Thematic Assessment Climate Change (co-editor), Cross-cutting Analysis (main editor), Capacity Development Action Plan (main editor), NCSA Report (main editor), for the Ministry of Labour, Technological Development and Environment (ATM), 2008-2009

- National Biodiversity Action Plan (NBAP), stakeholders consultation and reporting (project management and co-editor); for National Institute for Environment and Development in Suriname (NIMOS), 2007-2008
- Editing and lay-out of publications (reports, flyers, posters, etc); for various organisations, 2009-ongoing

**Feb 2006 – June 2007 The Netherlands (Stichting Erkend Groen)**

- Project planning, report writing and proposals for funding
- Project implementation and management
- Writing and publication of manuals on occupational safety and health

Actively involved in e.g. the following assignments:

- Legality of Timber in Suriname, management, assessment, training and reporting (project management and implementation); for Platform Houtsector Suriname (PHS), 2006-2007
- Veilig en Gezond Werken (Occupational Safety and Health), reporting and preparing presentations (co-editor); for CNV, 2006-2007

**Aug 2000 – Mar 2002 The Netherlands (OHRA Zorgverzekeraar, Health Insurer)**

- Administration of policy claims
- Customer service

**Other activities**

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**Dec 2003 - Sep 2004** OMF and IFES, Wageningen and Utrecht, The Netherlands, and Thailand  
Organizing and co-leading a four weeks orientation trip for students to Thailand.

**Apr 2000 - Apr 2004** Students' group, Wageningen, The Netherlands  
Participation in several commissions (introductory period, redaction of periodical) and leading sub-groups.

**Publications**

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- 2010** Various articles (interviews, reports, thematic discussions) on sustainable management in Suriname, published in Vakblad BOS & NATUUR  
Centre for Agricultural Research in Suriname (CELOS): 6 articles (in Dutch)
- 2007** S. van Dijk, R. de Wolf, R.L.H. Poels (in prep.). CELOS Management System in relation to Sustainable Forest Management. In: The CELOS Management System: CMS Principles, Implementation, Results and Experiences so far. G.M.J. Mohren, and R. van Kanten (eds.)
- 2006** A manual for employees and executives regarding occupational safety and health. (several parts)  
Stichting Erkend Groen / Vezor Publisher / CNV Veilig en Gezond Werken: 64 pages (in Dutch)
- 2006** A series of 12 info sheets on Occupational Safety and Health in Forestry  
Bosschap, trading organization for forestry and timber production in The Netherlands: each 2 pages (in Dutch)

**Skills**

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<b>Languages</b>	Dutch:	excellent in speaking, reading and writing
	English:	good in speaking, reading and writing
	Spanish*:	fair in speaking, reading and writing
	French*:	poor in speaking and writing, fair in reading

\* after refresher course

**Computer skills**

Good knowledge of and experience with Windows NT and XP, Microsoft Word, Microsoft Excel, Microsoft PowerPoint, Outlook, Internet Explorer, Adobe Acrobat, Photoshop and InDesign.  
Some experience with Microsoft Access, ArcGis, Dinamica Ego and Leap.  
In possession of typing diploma, gained in 1999.

**Other**

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In possession of driving license BE (Surinamese).

## CURRICULUM VITAE

JAN H.A. MOL

Family name Mol  
First name Johannes (Jan) Hubertus Adrianus  
Date of birth 24 November 1958  
Place of birth Oss (the Netherlands)  
Sex Male  
Nationality Dutch (the Netherlands)  
Civil status Married  
Work address Anton de Kom University of Suriname / CELOS, POB 9212, Leysweg, Paramaribo, Suriname  
Home address Verlengde Gemenelandsweg 127, Paramaribo, Suriname; tel. 597-465449  
E-mail [fisheco@celos.sr.org](mailto:fisheco@celos.sr.org) , [janevikim@hotmail.com](mailto:janevikim@hotmail.com)

## EDUCATION

1984: M.Sc. Biology. University of Utrecht, the Netherlands. Thesis - Interspecific competition between the European eel (*Anguilla anguilla*) and the bream (*Abramis brama*) in the shallow, eutrophic Lake Tjeukemeer, the Netherlands.

1995: Ph.D. Wageningen University, the Netherlands. Dissertation - Interspecific competition, predation, and the coexistence of three closely related Neotropical armoured catfishes (Siluriformes-Callichthyidae).

## COMMAND OF LANGUAGES

Mother tongue : Dutch  
Excellent : English  
Fair : German, French

## POSITIONS HELD

1986-1988 : Teacher in biology at secondary schools in Suriname.  
1987-1995 : Research associate at the Anton de Kom University of Suriname. Research on ecology and culture of neotropical armoured catfish.  
1996-present : Senior Lecturer, University of Suriname.  
1987-present : Ichthyologist in several rainforest expeditions of the National Zoological Collection of the University of Suriname and RAP-expeditions of Conservation International to the Kanuku Mountains, Guyana, and Central Suriname Nature Reserve, Suriname.  
1991-2000 : Secretary of the Institute of Agricultural Research (WAO) of the University of Suriname.  
1990-1992, 1996-2000 : Representative of the departments of Biology and Chemistry in the Board of the Faculty of Technological Sciences, University of Suriname.  
2001-present : Editor-in-chief of *Interactie*, journal of the University of Suriname

## PUBLICATIONS

1. Mol, J.H. (1993). Aquatic invertebrates of the Coastal Plain. In *The Freshwater Ecosystems of Suriname* (Ouboter, P.E., ed.), pp. 113-131. Dordrecht: Kluwer Academic Publishers.
2. Mol, J.H. (1993). Structure and function of floating bubble nests of three armoured catfishes (Callichthyidae) in relation to the aquatic environment. In *The Freshwater Ecosystems of Suriname* (Ouboter, P.E., ed.), pp. 167-197. Dordrecht: Kluwer Academic Publishers.
3. Mol, J.H. (1994). Effects of salinity on distribution, growth and survival of three neotropical armoured catfishes (Siluriformes - Callichthyidae). *Journal of Fish Biology* **45**, 763-776.
4. Mol, J.H. (1995). Ontogenetic diet shifts and diet overlap among three closely related neotropical armoured catfishes. *Journal of Fish Biology* **47**, 788-807.
5. Mol, J.H. (1995). Interspecific competition, predation, and the coexistence of three closely related neotropical armoured catfishes (Siluriformes-Callichthyidae). Ph.D. thesis Wageningen University, The Netherlands.
6. Mol, J.H. (1996). Reproductive seasonality and nest-site differentiation in three closely related armoured catfishes (Siluriformes: Callichthyidae). *Environmental Biology of Fishes* **45**, 363-381.
7. Mol, J.H. (1996). Impact of predation on early stages of the armoured catfish *Hoplosternum thoracatum* (Siluriformes-Callichthyidae) and implications for the syntopic occurrence with other related catfishes in a

- neotropical multi-predator swamp. *Oecologia* **107**, 395-410.
8. Mol, J.H. (1998). On reproduction in running water by means of a floating bubble nest: the reproductive ecology of Katerina kwikwi (*Megalechis personata*) in a small rainforest creek. *Interactie* (University of Suriname) **4**, 17-28.
  9. Mol, J.H. (2001). De teelt van de soké kwikwi (*Hoplosternum littorale*). *Interactie* **5**, 43-54. (State of the art of the culture of the armoured catfish *Hoplosternum littorale*) (in Dutch with English summary)
  10. Mol, J.H. (in prep). Man-eating by piranha *Serrasalmus rhombeus* (L., 1766) in Suriname, South America. Submitted to *Studies Neotropical Fauna and Environment*
  11. Mol, J.H. & F.L. Van der Lugt (1995). Distribution and feeding ecology of the African Tilapia *Oreochromis mossambicus* (Teleostei, Perciformes, Cichlidae) in Suriname (South America) with comments on the Tilapia - Kwikwi (*Hoplosternum littorale*) (Teleostei, Siluriformes, Callichthyidae) interaction. *Acta Amazonica* **25**, 101-116.
  12. Mol, J.H. & F.L. Van der Lugt (2004). Economische ontwikkeling en ecologische degradatie in Suriname. In *Suriname Schoon Genoeg? Hulpbronnengebruik en Milieubescherming in een Klein Amazoneland* (A.P.J. Mol, J.H. Mol & B. Van Vliet, eds), pp. 1-20. Van Arkel, Utrecht. (in Dutch)
  13. Mol, J.H. & D. Ponton (2003). Growth of juvenile armoured catfish *Megalechis thoracata* in neotropical swamps and a rain-forest creek as revealed by daily micro-increments in otoliths. *Journal of Tropical Ecology* **19**, 301-313.
  14. Mol, J.H. & P.E. Ouboter (2004). Downstream effects of erosion from small-scale gold mining on the instream habitat and fish community of a small Neotropical rainforest stream. *Conservation Biology* **18**, 201-214.
  15. Mol, J.H., W. Atsma, G. Flik, H. Bouwmeester & J.W.M. Osse (1999). Effect of low ambient mineral concentrations on the accumulation of calcium, magnesium and phosphorus by early life stages of the air-breathing armoured catfish *Megalechis personata* (Siluriformes: Callichthyidae). *Journal of Experimental Biology* **202**, 2121-2129.
  16. Mol, J.H., D. Resida, J.S. Ramlal & C.R. Becker (2000). Effects of El Niño-related drought on freshwater and brackish-water fishes in Suriname, South America. *Environmental Biology of Fishes* **59**, 429-440.
  17. Mol, J.H., J.S. Ramlal, C. Lietar & M. Verloo (2001). Mercury contamination in freshwater, estuarine, and marine fishes in relation to small-scale gold mining in Suriname. *Environmental Research* **86**, 183-197.
  18. Mol, J.H. (in press). Sustainable exploitation of neotropical fish resources: aquaculture trials with three callichthyid catfishes, *Hoplosternum littorale*, *Hoplosternum thoracatum* and *Callichthys callichthys*. In *Proceedings of the 2nd Joint Conference of the Universities of Guyana and Suriname on Sustainable Development in the Guyanas, Georgetown 1991*.
  19. Hostache, G. & J.H. Mol (1998). Reproductive biology of the neotropical armoured catfish *Hoplosternum littorale* (Siluriformes - Callichthyidae): a synthesis stressing the role of the floating bubble nest. *Aquatic Living Resources* **11**, 173-185.
  20. Mol, A.P.J., J.H. Mol & B. Van Vliet (eds) (2004). *Suriname Schoon Genoeg? Hulpbronnengebruik en Milieubescherming in een Klein Amazoneland*. Van Arkel, Utrecht, 218 pp. (in Dutch)
  21. Ouboter, P.E. & J.H. Mol (1993). The fish fauna of Suriname. In *The Freshwater Ecosystems of Suriname* (Ouboter, P.E., ed.). pp. 133-154. Dordrecht: Kluwer Academic Publishers.
  22. Ouboter, P.E. & J.H. Mol (1994). Ex-situ sustainable use of fish and wildlife in Suriname. *Interactie* **2**, 5-18.
  23. Ouboter, P.E., P.C. Dixit, M.C.M. Werkhoven, J.H. Mol & M. Khodabaks (in press). Some aspects of environmental research in Suriname with special emphasis on biodiversity. In *Environmentally Sound Socio-economic Development in the Humid Tropics*. Paris: UNESCO.
  24. Ponton, D., J.H. Mol & J. Panfili (2001). Use of otolith microincrements for estimating the age and growth of young armoured catfish *Hoplosternum littorale*. *Journal of Fish Biology* **58**, 1274-1285.
  25. Reis, R.E., P.Y. Le Bail & J.H. Mol, in prep. New arrangements in the synonymy in *Megalechis* Reis, 1997 (Siluriformes, Callichthyidae). Submitted to *Copeia*.

## PROFESSIONAL CONSULTING

- 1994-1995: Environmental consultant, baseline study on the fish and aquatic invertebrate fauna of coastal plain swamps at Onverwagt, Suriname. On behalf of Biliton Bauxite Mining Company, Suriname.
- 1994-1995: Environmental consultant, baseline studies on the fish and aquatic invertebrate fauna of (1) creeks and rivers draining the Golden Star gold concession area at Gros Rosebel, Suriname, and (2) the Kleine Saramacca River, Suriname. On behalf of RESCAN Environmental Services (Canada) and Golden Star Resources (Canada).
- 1998: Environmental consultant, baseline study of fish and aquatic macroinvertebrate fauna of coastal swamps and mangrove forests at the State oil concession Sara-Maria, Saramacca, Suriname. On behalf of State oil Suriname.



## **Curriculum vitae of Paul Edward Ouboter**

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***Date of birth*** 15 December 1954

***Sex*** Male

***Nationality*** Dutch

### ***Summary Curriculum vitae Paul Edward Ouboter***

Paul Ouboter is an experienced vertebrate zoologist, biodiversity expert and conservation biologist starting its carrier at high school and having published its first paper in a peer reviewed scientific journal before graduating from the University of Leiden. During its biology study he specialized in animal ecology and animal systematics. Before he left for Suriname in 1986, he was involved in research in Southern Europe, Eastern Africa and Nepal. In Suriname he started as curator of the National Zoological Collection of the Anton de Kom University of Suriname in 1987. Simultaneous with extending and organizing the collections, he did his PhD research on caiman ecology and received its PhD in Natural Sciences from the University of Leiden in 1996. During and after its caiman research he was active in many research projects in the fields of biodiversity inventories focused on fishes, amphibians, reptiles and larger mammals, status surveys of threatened species, studies in aquatic ecology and aquatic pollution. These research projects resulted in more than 70 publications in scientific and popular scientific journals, reports and invited chapters in books. He is editor and co-author of the book "The Freshwater Ecosystems of Suriname" (Kluwer Academic Publishers) and author of the book "Ecological Studies on Crocodilians in Suriname - Niche Segregation and Competition in Three Predators" (SPB Acad. Publishers). Several new books are in preparation.

He is a member of many international organizations, often on invitation, like the IUCN Crocodile Specialist Group since 1991 and the IUCN Declining Amphibian Task Force since 1992. In Suriname his advice on fauna and environment related issues is often sought by nature conservation and environmental government agencies and nature conservation NGO's.

***Education***

1975 graduated from high school  
 1984 MSc in Biology, University of Leiden,  
 The Netherlands.  
 Specializations: Animal Systematics, Animal Ecology.  
 1996 PhD in Natural Sciences, University of Leiden,  
 The Netherlands.  
 Thesis: Ecological studies on crocodylians in Suriname - niche  
 segregation and competition in three predators.

***Experience***Research activities

1973 - 1979	Island melanism and population ecology of Mediterranean lizards (Spain, Italy).
1978 - 1982	Zoogeography of reptiles and amphibians in high mountain ranges of Eastern Africa and Nepal.
1981 - 1982	Taxonomy of lizards of the Asian genus <i>Scincella</i> .
1982 - 1992	Ecology of caimans in Suriname.
1987 - present	Biodiversity of lower vertebrates of Suriname.
1989 - present	Environmental research on freshwater ecosystems of Suriname.
1990 - 2003	Zoogeography and community ecology of freshwater fishes of the Guianas.
1991 – 2002	Sustainable exploitation of caimans.
1994 - present	Impact of mining turbidity on aquatic ecosystems.
1998 - 2002	Biomonitoring of effluents and polluted streams.
1998 – present	Mercury pollution of Surinam aquatic ecosystems.
2004 – present	Biomonitoring terrestrial environmental impacts of mining.
1989 - present	Coordinating all kinds of research activities on wildlife biology, ecology and environmental sciences.

Consulting activities

April - May 1991	Feasibility study on crocodile farming at Shipstern Nature Reserve, Belize, Tropical Conservation Foundation.
June- August 1994	Baseline study Fauna for Lelydorp III Mining Area, Billiton.
May- October 1994	Baseline study and Environmental Impact Assessment for Wildlife and Aquatic Resources for Gross Rosebel Area, RESCAN/Golden Star.
June 1994-December 1996	Assisting the drafting of a National Biodiversity Strategy, ACT.
April - September 1995	Baseline study Fauna for Wane Hills Mining Area, Suralco.
July 1996	Comparison of Gros-Rosebel fish fauna with Kleine Saramacca fish fauna, RESCAN/Golden Star.
June 1995 - July 1997	Technical Coordinator for National Environmental Action Plan, IDPM/Organization of American States.
May - August 1997	Selection of protected areas for follow-up GEF project, Proplan/Global Environmental Facility.
March - December 1998	Environmental baseline study and impact assessment for Tambaredjo Area, IBT/State Oil.

May 1998 - June 1999	Aquatic Toxicity Biomonitoring Tests, Suralco.
May 1999 - present	Water quality assessment Paramaribo and surroundings, Sunecon/Ministry of Public Works.
December 1999	Black caiman status, Kaw Swamps, French Guiana, Association KWATA.
June – September 2000	Environmental study rehabilitation Topibo Swamp, Suralco.
July – December 2000	Wildlife management in Suriname, country report, IWOKRAMA.
February-March 2001	Wildlife trade assessment Suriname, WWF.
February-January 2002	Biodiversity parameter assessment for Upper Cusewijne Nature Reserve and Bigi Pan Multiple-Use Management Area, and performance assessment of the Nature Conservation Division, WWF.
February-June 2001	Project coordination and implementation of planning project “sustainable exploitation of the spectacled caiman at the Cusewijne River by the people of Bigi Poika”, Foundation Kamaraware.
February-December 2001	Assisting in drafting a National Biodiversity Action Plan for Wildlife Management and Protected Areas, NIMOS.
January-February 2002	Writing a directory for the protected areas of Suriname, CI-Suriname.
February-September 2002	Drafting a research and monitoring strategy and plan for the Central Suriname Nature Reserve, as well as a biodiversity database, CI-Suriname.
October 2005-January 2008	Environmental and Social Impact Study for Herpetology of the Bakhuis Mountains, SRK.
2005 – present	Aquatic Monitoring Rosebel Gold Mines Concession, RGM.
Aug 2006 – Jan 2007	Impact of increase of total suspended solids on the aquatic ecosystem of the Para River, BHP Billiton.
2006 – present	Wildlife Monitoring Rosebel Gold Mines Concession, RGM.
2009	Environmental and Social Impact Study for Herpetology of the Bakhuis Transport Study, SRK.
April-July 2009	High pH study in Effluent Treatment System, Rosebel Gold Mines.
May-July 2010	Environmental and Social Impact Study for Amphibians of the Nassau Mountains, ERM.

#### Teaching/higher education activities

1988 - 1998	Lecturer in Zoology & Population Ecology at the Faculty of Technology of the University of Suriname.
1988 - present	Lecturer in Vertebrate Zoology at the Teachers College.
1990 – 1995	Initiating BSc program in Environmental Sciences at the Faculty of Technology of the University of Suriname..
1990 - 2000	Lecturer in Ecology at the Teachers College.
2004 - present	Lecturer in Biodiversity and Monitoring at the Faculty of Technology of the University of Suriname.
2006 – present	Initiating MSc program in Conservation Biology at the University of Suriname.
2007 – 2011	Lecturer in Population Ecology at the Faculty of Technology of the University of Suriname.

2008	Lecturer in Zoology (Course Flora and Fauna) at the Faculty of Technology of the University of Suriname.
2011	Lecturer in Biodiversity Conservation & Nature Conservation Management at the Faculty of Technology and Faculty of Graduate Studies of the University of Suriname
2011	Lecturer in Field Methods for Conservation Biology & Taxonomy and Biodiversity Informatics at the Faculty of Graduate Studies of the University of Suriname
2003 – present	Advisor/Supervisor for several BSc and MSc theses projects.

### Management activities

1987 - present	Head and curator Vertebrates of the National Zoological Collection, University of Suriname.
1991 - 1997	Adjunct-head of the Department of Biology, Teachers College.
1991 – present?	Chairman, later member of the Board of the "Society of Biologists in Suriname".
1992 - present	Chairman of the Environmental Research Center, University of Suriname.
1992 - 2004	Chair for the Guianas of the "Declining Amphibian Populations Task Force" of the IUCN.
1993 - 1995	Head Department of Biology and Chemistry and member of the Board of the Faculty of Technology, University of Suriname.
1994 - 1997	General coordinator of the Amazonepact/UNDP Project, Biodiversity for Suriname.
1995 - 1997	Head Department of Environmental Sciences and member of the Board of the Faculty of Technology, University of Suriname.
1997 - 2002	Member of the Steering Committee of the UNDP/GEF Small Grants Program.
1999 – present	Director of IBER/Bioconsult
2007 - 2008	Vice-chair of the ATBC meeting 2008 to be held in Paramaribo
2009 - present	AdeKUS Focal Point for Regional MSc Programme in Biodiversity Conservation and Sustainable Development, University of the West Indies
2010 – present	Programme coordinator of the MSc Programme in Biology of the Faculty of Graduate Studies of the University of Suriname
2011	Head Department of Biology of the Faculty of Exact Sciences of the University of Suriname

### Scientific expeditions

1976 leader	Mt. Kilimanjaro, Tanzania; altitudinal distribution of lizards; expedition leader
1980	Mt. Kenya, Kenya; altitudinal distribution of lizards; expedition leader
1981	Annapurna-Dhaulagiri Ranges, Nepal; altitudinal distribution of reptiles and amphibians; expedition leader
1988	Sipaliwini Savanna, Suriname; caiman ecology; expedition leader
1989	Coeroeni-Sipaliwini River, Apalagadi Mt., Suriname; biodiversity inventory; expedition leader

1991	Upper Tapanahony River, Suriname; biodiversity inventory/caiman ecology; expedition leader
1993	Palumeu River, Kasikasima Mt., Suriname; biodiversity inventory; expedition member
1998	Oelemari River, Oranje Mts., Suriname; biodiversity inventory, expedition leader
2000	Kaw Swamps, French Guiana; black caiman inventory; expedition member
2003	Tafelberg Mt., Suriname; biodiversity inventory; expedition leader
2004	AquaRAP Upper Coppename River, Suriname; aquatic ecosystem inventory; expedition leader
2005	Tafelberg Mt., Suriname; biodiversity inventory; expedition leader
2006	Nassau Mt., Suriname; herpetofauna inventory; expedition leader
2010	Sipaliwini River RAP, herpetology

#### Other activities

2001-2002	Director, editor and videographer of a series of documentaries on the environment of Suriname.
2002 - present	Establishing and adapting a national electronic biodiversity database for Suriname based on Biolink (CSIRO, Australia)
2005 – present	Nature photographer

#### International contacts

1979 - 1997	Member of the "Dutch Society of Zoology".
1980 - 1995	Member of the "Societas Europaea Herpetological" and several other herpetological societies.
1991 - present	Invited member of the "Crocodile Specialist Group" and "Species Survival Commission" of the IUCN.
1992 - 2004	Coordinator for Suriname of the Network "Biodiversity and ecology" of the Amazon Cooperation Treaty.
1995 - present	Member of the "Association for Tropical Biology".
1996 - present	Member of the "Caribbean Academy of Sciences".
2002 – present	Invited member of the Scientific committee for the protected areas of French Guiana.
2006 - present	Member of the "Society for Conservation Biology".
2010 – present	Alternate member of the Animal Committee of CITES for the Caribbean region

#### Languages

	Read	Speak	Write
Dutch	excellent	excellent	excellent
English	excellent	good	good
German	good	-	-
French	fair	-	-

Spanish	fair	-	-
Sranan	good	fair	-

Publications (for detailed list see below)

First publication in a refereed scientific journal written before starting its study at the university. More than 70 publications on herpetology, ichthyology, ecology and environmental science in refereed scientific and semi-scientific journals and as reports.

Editor and co-author of the book "The Freshwater Ecosystems of Suriname" (Kluwer Academic Publishers).

Author of the book "Ecological Studies on Crocodilians in Suriname - Niche Segregation and Competition in Three Predators" (SPB Acad. Publ.).

Several books in preparation.

Referee for "Amphibia-Reptilia", "Biotropica" and "Acta Amazonica".

## Publications

(papers in peer reviewed scientific journals, invited chapters in scientific books and scientific books are in bold)

1. Ouboter, P.E. (1974): Enige notities over de herpetofauna van Puglia (Italië). *Lacerta* 32(7): 126-128.
2. Dubbeld, E. J. , Jacobi , W. , Kalverda, P. & Ouboter, P.E. ( 1974): Aantekeningen over *Lacerta pityusensis* in de natuur en in het terrarium. *Lacerta* 33(1): 3-12.
3. Ouboter, P.E. (1975): Waarnemingen aan *Lacerta sicula sicula* op een camping bij Sorrento (Italië). *Lacerta* 33(11): 163-167.
4. Ouboter, P.E. (1975): Aantekeningen over *Lacerta sicula monaconensis* Elmer, 1881. *Lacerta* 34(1): 8-10.
5. Ouboter, P.E. (1976): Een kruising tussen *Lacerta pityusensis kameriana* Mertens, 1927 en *Lacerta pityusensis vedrae* L. Müller, 1927. *Lacerta* 34(11): 138-141.
6. Ouboter, P.E. (1980): R.A. Avery, 1979: Lizards - A study in thermoregulation. *Lacerta* 39(1): 12. [Boekbespreking]
7. Ouboter, P.E. & Nanhoe, L.M.R. (1981): Sociaal gedrag van *Gonatodes humeralis en Lygodactylus picturates (1)*. *Lacerta* 39(11): 177-179.
8. Ouboter, P.E. & Nanhoe, L.M.R. (1981): Sociaal gedrag van *Gonatodes humeralis en Lygodactylus picturates (2)*. *Lacerta* 39(12): 196-199.
9. **Ouboter, P.E. (1981): The ecology of the island-lizard *Podarcis sicula salffi*: Correlation of microdistribution with vegetation coverage, thermal environment and food-size. *Amphibia-Reptilia* 2(3): 243-257.**
10. Ouboter, P.E. & Nanhoe, L.M.R. (1983): De oecologie van de brilkaaiman (*Caiman crocodilus*) in de Coesewijne. intern rapport STINASU/LBB, Paramaribo, pp. 20.
11. Ouboter, P.E. & Nanhoe, L.M.R. (1983): An ecological study of *Caiman crocodilus crocodilus* in Northern Surinam. Doctoraalverslag no. 233, Zoöl. Lab. Afd. Dieroecologie, Kath. Univ. Nijmegen, pp. 65.
12. Ouboter, P.E. & Nanhoe, L.M.R. (1984): De levenswijze van brilkaaimans (*Caiman crocodilus*) in het noorden van Suriname. *Lacerta* 43(2): 22-27.
13. **Ouboter, P.E. (1986): A revision of the genus *Scincela* (Sauria, Reptilia) of Asia, with some notes on its evolution. *Zool. Verh., Leiden*, 229: 1-66.**
14. Ouboter, P.E. & Nanhoe, L.M.R. (1987): Kaaimannen in Suriname. De West 14 maart 1987.
15. Ouboter, P.E. & Nanhoe, L.M.R. (1987): Kaaimannen in Suriname. De Ware tijd 17 maart 1987: 5.
16. **Nanhoe, L.M.R. & Ouboter, P.E. (1987): The distribution of reptiles and amphibians in the Annapurna-Dhaulagiri region (Nepal). *Zool.Verh., Leiden*, 240: 1-105.**
17. **Ouboter, P.E. & Nanhoe, L.M.R. (1987): Notes on nesting and parental care in *Caiman crocodilus crocodilus* in northern Suriname and an analysis of crocodilian nesting habits. *Amphibia-Reptilia* 8(4) : 331-348.**
18. Ouboter, P.E. (1987): Area reports: Suriname. IUCN Crocodile Specialist Group Newsletter 6: 13.
19. **Ouboter, P.E. & Nanhoe, L.M.R.- (1988): Habitat Selection and Migration of *Caiman crocodilus crocodilus* in a Swamp and Swamp-Forest Habitat in Northern Suriname. *J. Herpetol.* 22(3): 283-294.**
20. **Ouboter, P.E. & Nanhoe, L.M.R. (1989): Notes on the Dynamics of a population of *Caiman crocodilus crocodilus* in Northern Suriname and its Implications for Management. *Biol. Conserv.* 48(4) : 243-264.**
21. Ouboter, P.E. (1989): The distribution and abundance of caimans in Suriname. Abstr. First World Congress of Herpetology, 11-19 September 1989, Canterbury.

22. Ouboter, P.E. (1989): The Impact of an Indian Village on Caimans. (Area Reports: Suriname). IUCN Crocodile Specialist Group Newsletter 8: 28.
23. **Ouboter, P.E. (1990): Vocalization in *Podarcis sicula salfii*. *Amphibia-Reptilia* 11(4): 419-421.**
24. Ouboter, P.E. (1990): Crocodilians and pollution. (Area Reports: Suriname). IUCN Crocodile Specialist Group Newsletter 9(3): 12.
25. **Ouboter, P.E. & Nanhoe, L.M.R. (1991): Notas sobre la anidación y la protección de las crias por los padres en *Caiman crocodilus crocodilus* en el norte de Surinam y un analisis sobre el habitat de anidacion de los *Crocodylia*. In: F.W. King (ed.), *Crianza de Cocodrilos: Información de la Literatura Científica. Grupo de Especialistas en Cocodrilos, IUCN, Gland*, pp. 65 - 80.**
26. Ouboter, P.E. (1991): Feasibility Studies for Commercial Caiman Use. (Area Reports: Suriname). IUCN Crocodile Specialist Group Newsletter 10(2): 15.
27. **Ouboter, P.E. (1992): Status and conservation of crocodilians in northeastern Belize. Proc. 11th Work. Meet. Crocodile Specialist Group, Victoria Falls, Zimbabwe, 2-7 August 1992. Vol. 2: 18-29. IUCN, Gland.**
28. **Ouboter, P.E. (ed.)(1993): The Freshwater Ecosystems of Suriname. *Monographiae Biologicae. Kluwer Academic Publishers, Dordrecht.***
29. Ouboter, P.E. (1993): Introduction. In: P.E. Ouboter (ed.), *The Freshwater Ecosystems of Suriname*, pp. 1-6. Kluwer Academic Publishers, Dordrecht.
30. Ouboter, P.E. (1993): Part I: Basic features. In: P.E. Ouboter (ed.), *The Freshwater Ecosystems of Suriname*, pp. 7-12. Kluwer Academic Publishers Dordrecht.
31. **Haripersad-Makhanlal, A. & Ouboter, P.E. (1993): Limnology: physics-chemical parameters and phytoplankton composition. In: P.E. Ouboter (ed.), *Freshwater Ecosystems of Suriname*, pp. 53-75. Kluwer Academic Publishers, Dordrecht.**
32. **Ouboter, P.E. & Mol, J.H. (1993): The fish fauna of Suriname. In: P.E. Ouboter (ed.), *The Freshwater Ecosystems of Suriname*, pp. 133-154. Kluwer Academic Publishers, Dordrecht.**
33. Ouboter, P.E. (1993): Part II: Case studies. In: P.E. Ouboter (ed.), *The Freshwater Ecosystems of Suriname*, pp. 155-156. Kluwer Academic Publishers, Dordrecht.
34. **Ouboter, P.E. & Peeters, G.M. (1993): Annual cycle of the spectacled caiman. In: P.E. Ouboter (ed.), *The Freshwater Ecosystems of Suriname*, pp. 215-222. Kluwer Academic Publishers, Dordrecht.**
35. Ouboter, P.E. (1993): Part III: The human impact. In P.E. Ouboter (ed. ) , *The Freshwater Ecosystems of Suriname*, pp. 223-226. Kluwer Academic Publishers, Dordrecht.
36. **Ouboter, P.E. & De Dijn, B.P. (1993): Changes in a polluted swamp. In: P.E. Ouboter (ed.), *The Freshwater Ecosystems of Suriname*, pp. 239-260. Kluwer Academic Publishers, Dordrecht.**
37. Ouboter, P.E. & Mol, J.H. (1994): Ex-situ sustainable use of fish and wildlife in Suriname. *Interactie* 2: 5-18.
38. Ouboter, P.E., J.H.A. Mol, G.M.T. Peeters & S.A. Sahdew (1994): Environmental Baseline Study and Impact Assessment Gros-Rosebel Gold Concession. *Aquatic Resources & Wildlife. CMO, Paramaribo*, pp. 66.
39. Ouboter, P.E. & B. De Dijn ( 1996): Wildlife. In: CMO/FTeW (eds.), *Wane Hills Baseline Study*, pp. 215-233. CMO/FTeW, Paramaribo.
40. Ouboter, P.E. & B.P.E. De Dijn (1995): Dierlijke biodiversiteit in Suriname. *Eerste Workshop Nationale Strategie voor het Duurzame Gebruik en het Behoud van de Biologische Diversiteit, Paramaribo*, 15 pp.



41. Ouboter, P.E. & J. Ramlal (1995): Ecosystemen, biodiversiteit op een hoger niveau. Eerste Workshop Nationale Strategie voor het Duurzame Gebruik en het Behoud van de Biologische Diversiteit, Paramaribo, 12 pp.
42. **Ouboter, P.E. (1996): Ecological studies on crocodilians in Suriname. Niche segregation and competition in three predators. SPB Academic Publ., Amsterdam, pp. 139.**
43. Mol, J.H. & P.E. Ouboter (1996). The Fish Fauna Composition of the Kleine Saramacca River (Suriname, South America) as Compared to the Fish Fauna of the Gros-Rosebel Concession Area Mindrineti River. CMO, Paramaribo, pp. 19.
44. Ouboter, P.E. (ed.)(1996): Suriname - Draft National Environmental Action Plan. IDPM, Paramaribo, pp. 115.
45. Werkhoven, M.C.M. & P.E. Ouboter (1997): Area Profiles Dossier for the Workshop Selection Protected Areas. CMO, Paramaribo, pp. 42.
46. Ouboter, P.E. & M.C.M. Werkhoven (1997): Voorproject Inventarisatie Binnenland t.b.v. het Natuureserveringsbeleid. Intern report, Nederlandse Ambassade.
47. Ouboter, P.E., B. De Dijn & U. Raghoenandan (1999). Ecosystem inventory Ulemari area. WWF/NZCS/BBS, Paramaribo.
48. Quik, J.A.M. & P.E. Ouboter (1999): Aquatic Toxicity Biomonitoring of effluents of the Suralco Paranam plant. CMO, Paramaribo.
49. Quik, J.A.M. & P.E. Ouboter (2000): Water Quality Monitoring in the Commewijne Watershed, Suriname. WWF/CMO, Paramaribo, 18 pp.
50. **Ouboter, P.E., J.-C. Vie, T. Montford, M. Blanc & J.-M. PrevotEAU (2000). Black Caiman Population in Kaw Swamps. IUCN Crocodile Specialist Group Newsletter 19(2): 13-15.**
51. Ouboter, P.E. & F. v.d. Lugt (2000): Waterkwaliteit in Groot-Paramaribo. Bioconsult/Sunecon/DHV.
52. Ouboter, P.E. & R. Bakkum (2000): Masterplanstudie Ontwatering Groot-Paramaribo. Aspectrapportage Waterkwaliteit. Ministerie van Openbare Werken, Paramaribo, 56 pp.
53. Ouboter, P.E. & B.P.E. De Dijn (2000): Topibo Swamp Survey. Bioconsult, Paramaribo, 23 pp.
54. Ouboter, P.E. (2000): Wildlife Management in Suriname. IWOKRAMA/Bioconsult, Paramaribo, 21 pp.
55. Ouboter, P.E. (ed.)(2000): Bibliography for Suriname. Wildlife research, wildlife management, conservation. IBER/Bioconsult & NZCS, Paramaribo, 67 pp.
56. Ouboter, P.E. (2001): Assessment of Traded Wildlife Species. WWF, Paramaribo.
57. Ouboter, P.E. & S. Adhin (2001): Assessment of biological parameters for the Boven-Coesewijne Nature Reserve, Bigi Pan Multiple Use Management Area and parameters for the performance improvement of the Nature Conservation Division. WWF, Paramaribo.
58. Ouboter, P.E. & S.A. Sahdew (2001): Vertebrates. In: H. Hiwat (ed.), The impact of sustainable forestry on biodiversity in the Kabo area. Report WWF.
59. Ouboter, P.E. (2002): Directory of protected areas of Suriname. CI-Suriname, Paramaribo.
60. Ouboter, P.E., J. Mol & J. Quik (2003): De invloed van atmosferisch transport van kwik op het kwikgehalte in water en biota in rivieren van Suriname. Verslag aan Schure-Beyerinck-Popping Fonds.
61. **Mol, J.H.A. & P.E. Ouboter (2004): Downstream Effects of Erosion from Small-Scale Gold Mining on the Instream Habitat and Fish Community of a Small Neotropical Rainforest Stream. Conserv. Biol. 18(1): 201-214.**
62. Ouboter, P.E. (ed.)(2005): Flora and fauna assessment of the Tafelberg. Final report to SCF.
63. **Ouboter, P.E. & G. Landburg (2006): Water Quality of the Coppename River Basin, with notes on aquatic fauna distribution. In Alonso, L. E. & H.J. Berrenstein (eds.), A Rapid Biological Assessment of the Aquatic Ecosystems of the Coppename River Basin, Suriname. RAP Bulletin of Biological Assessment 39: 37-46.**
64. Arets, E.J.M.M., P.J. v.d. Meer, N.W. v.d. Brink, K. Tjon, V.P. Atmopawiro & P.E. Ouboter

- (2006): Assessment of the impacts of gold mining on soil and vegetation in Brownsberg Nature Park, Suriname. Alterra Report 1359, pp. 26.
65. **Ouboter, P.E., R. Jairam & K. Wan Tong You (2007): Additional records of amphibians and reptiles from Nassau Mountain, Suriname. In: Alonso, L.E. & J.H. Mol (eds.), A Rapid Biological Assessment of the Lely and Nassau Plateaus, Suriname (with additional information on the Brownsberg Plateau). RAP Bulletin of Biological Assessment 43: 126-129.**
  66. **Mol, J., K. Wan Tong You, I. Vrede, A. Flynn, P. Ouboter & F. v.d. Lugt (2007): Fishes of Lely and Nassau Mountains, Suriname. In: Alonso, L.E. & J.H. Mol (eds.), A Rapid Biological Assessment of the Lely and Nassau Plateaus, Suriname (with additional information on the Brownsberg Plateau). RAP Bulletin of Biological Assessment 43: 107-118.**
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  73. Ouboter, P.E. (2008): Mercury Pollution in Aquatic Ecosystems in Suriname due to Small-scale Gold Mining. In: ATBC (ed.), Past and Recent History of Tropical Ecosystems: Cross-Continental Comparisons and Lessons for the Future, p. 199. Abstracts of the ATBC Annual Meeting, 9-13 June, 2008, Paramaribo, Suriname, South America.
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  75. Ouboter, P.E., M. Hardjoprajitno, V. Kadosoe, C. Kasanpawiro, K. Kishma & A. Soetotaroeno (in press): A comparison of large mammal communities between Brownsberg, Raleighvallen and Coesewijne, Suriname. Acad J. Suriname.
  76. Ouboter, P.E. (in prep.): The Protected Areas of Suriname/De beschermde gebieden van Suriname. IBER Nature Productions.
  77. **Ouboter, P.E. et al. (in prep): Mercury Levels in Pristine and Gold Mining Impacted Aquatic Ecosystems of Suriname, South America**
  78. **Ouboter, P.E. & R. Jairam (in prep.): Amphibians of Suriname.**
  79. **Ouboter, P.E. et al. (in prep.): A Fieldguide to the Reptiles of Suriname.**

# Paul Whincup

Water Specialist



Paul Whincup joined ERM as Regional Technical Director in Asia Pacific in 2001 from URS Dames & Moore where he was Vice President and General Manager Asia from 1994 to 2001.

He has 40 years of international experience in Australia,, Asia, UK, Europe, Middle East, the Indian subcontinent, Africa and South America with project involvement in over 30 countries.

## Professional Affiliations and Registrations

- Fellow and Chartered Professional Environmental, Australasian Institute of Mining and Metallurgy
- Member, International Association of Hydrogeologists (IAH)
- Former President, IAH, Australian Chapter
- Former President, Australian Drilling Industry Association
- Former Director, Australian Drilling Industry Training Committee
- Formerly on Editorial Board of International Journal of Applied Hydrogeology and Journal of Land Contamination and Reclamation

## Fields of Competence

- Water supply and water management
- Environmental impact assessment

## Education

University of St. Andrews, Scotland, B.Sc. (Hons) in Geology, 1962

## Experience

- Geological Survey of Western Australia, Hydrogeologist and Engineering Geologist, 1963-1970,
- Geotechnics (Aust) Pty Ltd, Chief Hydrogeologist, 1970-1973
- Groundwater Resource Consultants, Founder and Managing Director, 1973-1984. Acquired by Dames & Moore in 1984
- Partner and Vice President Dames & Moore 1988 to 2001
- ERM Technical Director Asia-Pacific

## Key Projects

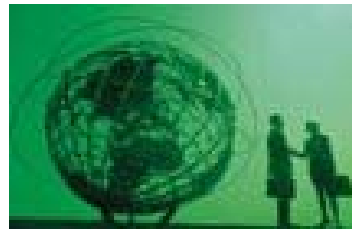
- Lead Consultant for development of conjunctive use water strategy for the CIC Mmamabula Energy Project in Botswana involving surface water transmission from the north of Botswana and fossil groundwater aquifers. Also development of water management plan.
- Technical adviser to BHP Billiton on closure of the Beenup mineral sands dredging project in Western Australia.
- Hydrogeological studies for VALE INCO on Residual Storage Facilities at lateritic nickel mining and processing operations in Sulawesi, Indonesia.
- Hydrogeological modeling and karstification studies for Eramet (Weda Bay Nickel) at the proposed limestone mining areas in Halmahera.
- Project Director for modeling of open cut coal mine dewatering for CIC MEP project in Botswana including transport of acid mine drain sulphate drainage plume and development of mine closure plan on the basis of monitored natural attenuation.
- Evaluation of the causes of the Kurnia Banjar Pani mud volcano near Surabaya, Indonesia on behalf of a Japanese oil exploration company.
- Chairman of Peer Review Committee for the South West Yarragadee aquifer, Western Australia Government
- Water management and groundwater supply installation for BP Tangguh LNG project, West Papua, Indonesia.
- Project Director for contaminated site investigation and remediation in many countries including Australia, Spain, Italy, UK, China, Taiwan, Hong Kong, Korea, Malaysia, Philippines, Singapore, Thailand, Indonesia involving fertilisers, mining wastes, hydrocarbons, heavy metals, radioactivity, PCBs, solvents and others using a range of in situ and ex situ remediation techniques.
- Review of parameters established by RioTinto for derivation of targets and key performance indicators for water management.
- High Level Water Management Assessment of the Freeport Grasberg Mining Complex, Indonesia for PT Freeport Indonesia, including review of preferred groundwater pathways in karstic limestone.
- Water supply evaluation for proposed Mitchell Plateau bauxite mine, Kimberley region Western

## Australia

- Water supply evaluations for Koolan and Cockatoo Islands, Kimberley region Western Australia
- Water supply evaluation for Groote Eylandt, Northern territory.
- Engineering geologist during construction of Ord River Dam and Moolalabra Creek Dam, Kimberley Region, Western Australia.
- Member of BHP Billiton corporate audit team, Tintaya copper mine Peru
- Development of quantitative and qualitative groundwater model of the Freeport mine lowlands tailings disposal area for input to the Ecological Risk Assessment
- Review of sink hole development in Bukit Merah village, Malaysia leading to closure of adjoining tin mining operation
- Expert witness for the Supreme Court Inquiry into Mining beneath the Stored Waters of the Southern Coalfields of NSW.
- Dewatering of coal mines at Collie for Griffin Coal, Western Collieries and in New Zealand at Huntly West and Greymouth.
- Water supply for Kaltim Prima Coal, Cliffs Robe River (Pannawonica town supply), Mt Newman railway, Leinster township (published paper).
- Dewatering for Mt Isa Mines, Hilton (published paper), Perseverance nickel (published paper), GEMCO manganese, Renison Bell.
- Water supply and environmental impact assessment for mineral sand mines for Western Titanium, Westralian Sands, Western Mineral Sands, Cable Sands, Cudgen, Allied Eneabba, Consolidated Rutile, Laporte
- Tailings Dam assessments for CSBP & Farmers Kwinana, Kwinana Nickel Refinery, Freeport, Agip, Perseverance, Alcoa, Mount Isa Mines, Freeport.
- Contamination assessment and remediation of groundwater at Kwinana Nickel Refinery and tailings ponds for WMC.
- Contamination assessment and remediation for Kwinana Steelworks of Australian Iron and Steel and adjacent sites (Chemical Industries Kwinana, BP Refinery and Alcoa alumina refinery).
- Water supply and contamination assessment of tailings ponds for Alcoa Kwinana, Wagerup and Pinjarra alumina refineries, including Rhone Poulenc gallium/rare earth proposed facility at Pinjarra.
- Contamination assessment and remediation for Laporte Titanium, Australind (published paper).
- Baseline studies for Worsley alumina refinery at Worsley and Boddington and for proposed Mitchell Plateau bauxite mining project, including proposed refinery and port near Geraldton, Western Australia.
- Design and installation of expanded borefield for Geelong Water Board building on the initial borefield installed in 1985. Water management and desertification control for the Kela II gas field in Taklamakan Desert, Xinjiang Province, North West China
- Project Director for Environmental and Social Impact Assessment for the 4,000 km long West to East gas pipeline in China including development of water management plans during construction.
- Project Manager for clean up of floating product in Chalk aquifer adjacent to River Thames.
- Environmental and groundwater pollution studies in Queensland (mineral sand mining, mine water disposal), Western Australia (mine water disposal leakage from tailings ponds of acid and alkali residues, deep well injection of toxic wastes, evaluation and investigation of radioactive waste disposal sites) and Victoria. Regional studies of groundwater pollution from large industrial complexes and development of appropriate management and legislative guidelines.
- Principal Consultant. Groundwater pollution control for many industrial and processing facilities in Australia including chemical, fertiliser, pesticide, hydrocarbon and radioactive wastes, 1974-90.
- Project Director and Specialist Groundwater Consultant: Master Plan Study for Rural Water Supply, coastal region of Sarawak 1986-90.
- Principal Hydrogeologist: Master Plan Studies for Cimanuk River Basin (1979), Cisanggarung River Basin (1982) and South West Mountains (1981), in West and Central Java.
- Project Manager - Gnangara Mound Groundwater Resource Development Plan, Environmental Review and Management Plan, Western Australia, 1986; Perth Urban Water Balance Feasibility Study, 1983.

# Yinka Afon, P.E.

## Project Engineer



Mr. Afon is a professional engineer and environmental consultant with over seven years of experience in air quality evaluations, greenhouse gas (GHG) inventories, meteorology, acoustics and sound propagation modeling, vibration, water resources, public safety and security, regulatory compliance, and preparation of National Environmental Policy Act (NEPA) documents including environmental impact statements and environmental assessments.

He has experience preparing environmental assessments and environmental impact statements for a wide variety of projects including development of mining and refining/processing operations, hydroelectric facilities, wind farms, nuclear power plants, transmission lines, onshore and offshore liquefied natural gas facilities, gas storage facilities, gas pipelines, compressor stations, and transportation projects. He also has international experience in countries such as Suriname, Guatemala, Greenland, Bahamas, and Nigeria.

### Professional Affiliations and Registration

- Registered Professional Engineer, State of Maryland
- Member of Air & Waste Management Association
- Member of American Institute of Chemical Engineers

### Education

- M.S.E., Environmental Process Engineering, Johns Hopkins University, Baltimore, Maryland, 2004
- B.S., Chemical Engineering, Ladoke Akintola University of Technology, Nigeria, 2001

### Publication

- Afon Y and Ervin D. *An Assessment of Air Emissions from Liquefied Natural Gas Ships Using Different Power Systems and Different Fuels*. Journal of Air & Waste Management Association No.3, Vol 58, 404 - 411 (2008).

### Key Industry Sectors

- Mining, and refining/processing
- Oil, gas, and pipeline development
- Wind and nuclear energy
- Transportation

### Key Projects

**Suralco Inc. - Nassau Plateau Bauxite Mine and Transport Road ESIA, Suriname, Ongoing.** Currently serving as the project engineer for the preparation of an ESIA for a bauxite mine on Nassau Plateau and associated transport road to meet both Suriname and international standards for Alcoa. Prepared existing conditions and impact analysis for air quality, GHGs, noise, odor, natural hazards, ground vibration airblast overpressure, and flyrock. The ESIA is being prepared in accordance with the legal and regulatory framework for EIS in Suriname (NIMOS) and the World Bank Group/International Finance Corporation (IFC) Performance Standards.

**Suralco Inc. - Alumina Refinery Residue Expansion and Refinery Modification, Suriname, 2007 - 2008.** As Project engineer, provided resource expertise for the preparation of an ESIA associated with the expansion of Suralco's alumina refinery dry residual disposal areas (DRDAs). The refinery's need to process approximately 23% more bauxite required the creation of two additional DRDAs. Prepared existing conditions and impact analysis for air, GHGs noise, odor, infrastructure, and vibration resources. Developed an environmental management plan for the project based on recommendations and mitigation measures listed in the ESIA. The project was prepared in accordance with NIMOS and the World Bank Group/ IFC Performance Standards.

**Staatsolie - Wageningen Sugarcane-to-ethanol Project, Suriname, Ongoing.** Currently serving as the Deputy Project Manager for the preparation of an ESIA for constructing and operating a Sugarcane-to-Ethanol Plant in the Wageningen Area of District Nickerie in Suriname. The plant is expected to produce 80 - 90 million liters of ethanol per year. Tasks include project management, stakeholder consultations, and preparation of some ESIA sections such as air quality and climate, GHGs, noise, odors, natural hazards, and vibration. The ESIA is being prepared in accordance with NIMOS and the World Bank Group/ IFC Performance Standards. Key issues to be addressed in the ESIA include water use (needed for sugarcane cultivation), water quality, land use management and ownership, air quality, and noise.

**PolyMet Mining Inc. - NorthMet Mine & Ore Processing Project, MN, 2007 to present.** As Project engineer, provided resource expertise and reporting for an EIS evaluating noise, water resources, air quality, greenhouse gases, energy and climate change effects of operating a mine and low-grade sulfide ore and precious metals processing facility in northeast Minnesota. Some of the major issues associated with the project

were water management, tailings management, mercury issues and effects on wild rice.

**Alcoa - Air Quality, Noise, and Meteorological Studies for a Proposed Aluminum Smelter and Hydroelectric Facility in Greenland, 2009.** As Project engineer, provided resource expertise for the preparation of an environmental baseline study associated with the development of an aluminum smelter and hydroelectric facility in western Greenland. Prepared existing conditions for resources such as climate, air quality, greenhouse gases, and noise. Conducted ambient noise measurements at the smelter site and at noise sensitive areas in the Town of Maniitsoq to establish baseline noise levels. Monitored meteorological data measured from a meteorological station at the smelter site. Provided monthly meteorological data monitoring report to client.

**AEI Inc. - Jaguar Thermal Electric Power Plant Project, Guatemala, 2008.** Project engineer for evaluating noise effects of operating a 300 MW thermal electric power plant in Guatemala in accordance with IFC EHS guidelines. The evaluation was performed as part of the project's ESHIA process. Provided noise impact support services and coordinated the modeling of noise emissions from over 1,200 identified major noise sources at the Site. Assessed and evaluated the off-site noise effects associated with coal and limestone truck deliveries on nearby noise sensitive receptors.

**Proctor & Gamble - Agbara Industrial Estate Manufacturing Project, Agbara Town, Nigeria, 2010.** As Project engineer and environmental specialist, reviewed the draft ESIA associated with P&G's proposed development of a new 40 ha facility for manufacture, storage and distribution of consumer goods within Agbara Town, Ogun State, Nigeria. Participated in a Public Disclosure Meeting at the king's palace in Agbara Town to discuss potential social and environmental issues. Some of the major issues addressed at the meeting include the project's effect on traffic, solid waste handling, jobs for the locals, odor from wastewater and sewage, wastewater treatment and discharge sources, noise, and air pollution.

**BP Alternative Energy - White Pines Wind Power Project, Huron-Manistee National Forests, Mason County, MI, 2009.** Project engineer for an EIS evaluating public safety & security issues associated with the development of a proposed wind farm near Manistee, Michigan. The wind farm is expected to have 28 wind turbine generators, each rated at 2.5 MW.

**Areva - Technical Support for Licensing Two New Nuclear Facilities, U.S. East Coast, 2008.** Provided technical and environmental support for the preparation of combined license (COL) applications for two new 1600 MW nuclear reactors in Bell Bend, PA, and Scriba, NY. Coordinated with

other sub-contractors to address client's comments and ensured the applications were submitted to Nuclear Regulatory Commission within the scheduled time. The COL applications were prepared in accordance with NRC's NUREG 1555 and Regulatory Guide 4.2.

**Floridian Natural Gas Storage Company - Floridian Natural Gas Storage Project, FL, 2007-2008.** As Project engineer and 3rd Party EIS contractor with FERC, provided resource expertise and management for development of a 100 MMscf per day natural gas storage and liquefaction facility and a 4-mile pipeline in Martin County, Florida. Prepared existing conditions and impact analysis for air quality and noise and provided quick responses to public and agency comments. Final EIS for construction of storage facility was approved by the Federal Environmental Regulatory Commission in 2008 with some licensing conditions.

**Excelerate Energy - Northeast Gateway Deepwater Port LNG Terminal and Pipeline, Massachusetts Bay, 2006.** As Project engineer and 3rd Party EIS contractor with U.S Coast Guard, provided resource expertise and management for development of a 400 MMscfd per day LNG deepwater port with specially-designed regasification vessels and associated pipelines in Massachusetts Bay. Prepared an air conformity analysis report in accordance with Massachusetts State Implementation Plans (SIPs) and participated in consultation with brokers for purchasing emission reduction credits to offset project emissions. Wrote air quality and noise sections of EIS and provided quick responses to comments from various agencies and the public. The Maritime Administration issued a Record of Decision for the deepwater port in 2006. The port is currently in operation.

**BP - Crown Landing LNG Project, NJ, 2004 -2007.** Project engineer for the preparation of a FERC application for the development of a 1.2 Bscf per day onshore LNG facility and associated pipeline corridors in Logan township, NJ. Performed a terminal system alternatives analysis and evaluated project impacts on air quality, noise, and water resources. Prepared a facility-wide air permit application for the terminal and ships at berth.

**AES Corporation - Sparrows Point Onshore LNG and Power Plant Project, Baltimore, MD, 2006 - 2008.** Working with Maryland DNR and PPRP staff, reviewed and provided comments to noise and air quality sections of applicant's resource reports and FERC prepared-EIS for a proposed 1.5 Bscf per day onshore LNG facility and power plant in Baltimore, MD. Reviewed and provided comments to project's draft general conformity report and emission calculations. Final EIS for construction of the storage facility was approved by the Federal Environmental Regulatory Commission in 2008 with some licensing conditions.

# J. Gabriel Luna



Mr. Gabriel Luna is an associate geologist based in ERM's Exton, Pennsylvania office. He has over 5 years of experience working with the US Geological Survey Water Resources Division as a hydrologist. He has managed stream gaging stations throughout Kansas and Alaska as part of a nationwide streamflow monitoring network. His environmental field experience includes water sampling, measuring field parameters, supervising the installation and abandonment of monitoring stations, and calibration and maintenance of field equipment.

His project experience includes site investigations, subcontractor management, organization and oversight of field sampling, public and confidential file review, and technical report writing.

Mr. Luna has conducted work and supported projects in Pennsylvania, Maryland, New Jersey, Delaware, Connecticut, Massachusetts, West Virginia, Virginia, Kansas, Colorado and Alaska.

## Fields of Competence

- Site Investigation and Remediation
- Data analysis and technical report preparation
- Soil, surface water, ground water, ambient air and soil vapor sampling
- Geological logging of soil and bedrock
- Coordination of field investigation studies
- Phase II Environmental Site Assessment
- Technical Software Packages: WinRiver II, Microsoft Excel, Adobe Acrobat 8.0, Windows XP
- Collection and interpretation of Acoustic Doppler Current Profiler data

## Education

- B.S., Environmental Geoscience, University of Notre Dame, 2001
- Occupational Safety and Health Administration (OSHA) 40-hour Hazardous Waste Site Operations (HAZWOPER) training, 2007
- OSHA 8-hour HAZWOPER Refresher training, 2008
- Site Remediation Basics course through Rutgers University and the New Jersey Agricultural Experiment Station Office of Continuing Professional Education, 2008
- Wilderness First Aid and Heartsaver AED Certified (includes CPR)



## Key Projects

Nassau Plateau Bauxite Mine ESHIA, Suriname. Field geologist that participated in the installation of a network of piezometers, stream and rain gauges, and a meteorological station to evaluate the hydrological characteristics of the Nassau Plateau. Provided field training and evaluated the collected data to assess the impacts of the mine Project on the hydrological resources of the Plateau. The work on the Project also included the writing of the geology sections of the ESHIA and preparation of geological cross sections.

Organized and completed several frac-water characterization sampling events at natural gas wells located within the Marcellus Shale formation for a confidential client. Duties included coordination with onsite contractors to determine appropriate sample intervals, sample collection and logistical correspondence with an analytical laboratory for submission and analysis of time-sensitive characterization parameters.

Lead geologist for an extraction well installation at a New Jersey Superfund Site containing LNAPL including PCB's. Reviewed and compared previous soil logging and laser-induced fluorescence (LIF) data to observations conducted during drilling to determine appropriate well construction.

Field geologist for a Phase II Environmental Assessment for a due diligence effort involving a Pennsylvania landfill land acquisition. The work included soil sampling, monitoring well installation and sampling, field survey oversight and preparation of a Phase II Environmental Site Assessment report.

Completed soil gas and Summa canister ambient air and sub-slab vapor sampling at a northern New Jersey site to monitor performance of a biosparging system. Used a TVA 1000 meter, a combined PID and FID.

Project geologist for a site investigation effort at an aerosol products manufacturing facility in Bucks County, PA. Completed document review, oversight of soil boring installation, soil sampling, and oversight of monitoring well installation, ground water sampling and attended client meetings.

Field geologist for a site investigation of a former manufacturing facility in eastern West Virginia. Supervised the installation of sub-slab vapor monitoring points and soil borings. Sampled sub-slab soil gas and soil and provided oversight of subcontractor cleanup activities.

Lead field geologist for a Brownfields Redevelopment project in New Jersey. Field activities have included using GPS to locate and mark sampling locations within a 10+ acre site, installation and sample collection of 40+ soil vapor points within a former landfill, and collection of 20+ ground water samples following New Jersey DEP low-flow guidelines. Project geologist for a real estate purchase due diligence investigation focusing on USTs in Baltimore, MD. Supervised soil boring installation and collected soil samples. Wrote field related portions of Phase II letter report and created soil boring logs and table of sample analysis. Field activities and report were completed in less than one week in order to allow real estate transfer to proceed on schedule.

Provided technical support and supervised subcontractor replacement of a packer system in a ground water well at a NPL Superfund site in eastern Pennsylvania. Field geologist for a routine round of ground water sampling at a chemical plant in Chester County, PA. Field methods included the use of a PID for VOC level screening, collection of ground water samples by the low-flow method using a peristaltic pump and decontamination of equipment between sampling points. Facility required adherence to specific safety protocol. Ground water samples were analyzed for metals, VOCs and SVOCs.

Performed subcontractor oversight and soil sampling during excavation of drain lines at a Superfund site in Virginia. Duties included direction of excavation activities, enforced adherence to health and safety protocol and QA/QC observation.

Field geologist for an LNAPL plume delineation project at a coal burning power plant in Delaware. The project utilized LIF technology coupled with direct push drilling to create a near real-time three-dimensional model of the contaminate plume at the site. Collection of soil samples and installation of temporary piezometers was completed to verify the LIF results.

Installed and maintained monitoring equipment, collected data and reported findings from surface water and groundwater investigations at locations throughout Kansas and Alaska. Equipment used includes Rio Grande Acoustic Doppler Current Profiler (ADCP), various submersible and non-submersible pressure transducers, Sutron and Campbell Scientific dataloggers and field surveying equipment.



# James G. Nalven

Environmental Compliance, Hydrogeologist



James Nalven is a Consultant within ERM based in Denver, Colorado. Mr. Nalven has more than 30 years experience in environmental compliance, hydrogeology and environmental management. Much of this experience has involved natural resource projects and companies. He has extensive mining experience in coal, gold, copper, molybdenum, iron, aggregates, lithium, lead/zinc, chromium, uranium, phosphate, and talc mines and processing facilities. Other industrial related activities include work at fertilizer plants, power plants, secondary lead smelter, hazardous waste landfill, pesticide plant, petroleum facilities, dams, and real estate developments.

Mr. Nalven has worked in a wide variety of environmental and hydrologic areas. These include water supply, water rights, ground water contamination, hydrologic monitoring, geophysics, hydrologic portions of environmental assessment projects and hydrologic aspects of permitting. Participated and managed environmental portions of merger and acquisitions reviews by large mining company. For a major mining corporation, Mr. Nalven was the hydrologist for the coal and copper divisions, the chief environmental engineer for the coal division and corporate manager of environmental compliance. He has also provided consulting services, primarily providing hydrologic and environmental compliance services to mining companies. Mr. Nalven spent more than four years working for a very large copper/zinc mine in Peru where he was in charge of environmental compliance as well as heading a one-year water management and ground water study.

## Professional Affiliations & Registrations

- National Ground Water Association
- American Water Works Association
- Environmental Auditing Roundtable
- Association of Engineering Geologists
- Society for Mining, Metallurgy and Exploration
- Colorado Mining Association

## Fields of Competence

- Environmental compliance management and audits
- Environmental program management
- Water balance studies
- Coal mine permit preparation and submittal
- Management of environmental aspects of mine due diligence studies
- Post-closure option evaluation
- Toxic Release Inventory evaluations
- Design of hydrologic monitoring programs
- NPDES permitting
- Development and management of large hydrologic databases
- Mine inflow studies
- Ground water contamination studies
- Design, supervision and interpretation of pumping and slug test data

## Education

- M.S., Applied Geology, Rensselaer Polytechnic Institute, 1972.
- B.S., Geology, Rensselaer Polytechnic Institute, 1971
- Creating, Conducting and Evaluating Environmental Compliance Audits short course – Executive Enterprises
- Environmental Auditing Advanced Workshop – Government Institutes
- Design of Water Quality Monitoring Networks short course – Colorado State University
- Toxic Release Inventory Training for New Industries (multiple courses) – USEPA
- Radiation Safety Officer Training – Applied Health Physics

## Languages

- English, native speaker
- Spanish

## Key Industry Sectors

- Mining

## Publications

- *Toxic Release Inventory Reporting and Consequences for a Typical Gold Mining Facility*, SME Annual Meeting, Denver, Colorado, 1999
- *Tighten My Discharge Limits (TMDL): NPDES Renewals Under the TMDL Program*, National Western Mining Conference, Colorado Springs, Colorado, 2000 (Presentation)

## Key Projects

Managed large surface and ground water monitoring program to maintaining compliance at a copper/zinc mine. In three years compliance improved from 85% to greater than 99%. Also performed general hydrologic services, including permitting, mine closure analyses, water supply, water management and water disposal options review at a mine, port and camp in Peru. Trained staff and technicians in water data analysis and management and water sampling methodologies.

Conducted over 60 environmental audits in over 20 states and three foreign countries, primarily of coal and metal mining, and mineral processing facilities.

Developed and managed environmental auditing program for large coal, metal and gold mining company.

Performed environmental due diligence studies of coal mines in New Mexico, Indiana, Colorado and Canada, a proposed base metal/gold mine in Maine, metal processing facility in New Jersey, iron mines in Minnesota and Perú and petroleum production facilities in Texas and Louisiana.

Prepared Toxic Release Inventory evaluations for mining and milling facilities, including copper, molybdenum, gold and coal facilities and provided TRI training at some of the facilities.

Performed a Global Reporting Initiative assurance review of a large gold mine in Perú.

As part of the Colorado Mining Association Coal Committee, was active in negotiations with the state leading to revisions of the coal mining regulations.

Conducted hydrology investigations for due diligence studies of large copper mining and processing facilities in Arizona.

Worked with cyanide related issues at gold heap leach operations, gold tailing operations, copper operations and molybdenum operations. These included incident studies, environmental management reviews, environmental audits and due diligence reviews.

Performed the hydrogeologic portion of a Phase II study of a major airport in Bolivia.

Performed a final environmental review of a proposed gold mine in New Zealand prior to the company approving the project.

Performed baseline hydrologic monitoring and analyses for uranium mining, coal mining and coal gasification projects in the western United States.

Reviewed environmental, reclamation and closure portions of feasibility studies for two proposed mines in Mongolia. Reviewed and updated closure plan for large coal mine in Colombia.

Oversaw and conducted negotiations with the Minnesota environmental agencies leading to the successful acquisition and re-permitting of the environmentally sensitive and bankrupt Reserve Mining property.

Revised mine inflow estimates and hydrologic portion of a coal mine permit.

Participated as the mining environmental expert on a team evaluating environmental insurance recovery potential for a large mining company.

Provided the technical support for and expert testimony before the Colorado Water Quality Control Commission that successfully led to requested changes in the stream standards at a coal mine.

Developed and maintained a water quality database and reporting procedures for five coal properties and a molybdenum mine that enabled timely and accurate completion of six hydrology reports per year.

Evaluated hydrologic data and produced mine inflow estimates for an underground base metal mine in Mexico.

Performed 3rd party environmental audits of waste handling companies.

Performed surface water quality mass-balance modeling for closure issues related to two mines in the Rocky Mountain west.

Managed the mine planning, geology and environmental aspects of a tar sand exploration project in Utah.

Performed a water supply and water balance study for a large open pit copper mine in Arizona and water balance studies of a secondary lead smelter, underground coal mine and pesticide plant.

Developed ground water and infiltration gallery water supplies for mines and real estate developments in the western and southeastern United States.

Evaluated ground water impacts of phosphate mining gypsum stacks in Florida.

Developed monitoring programs to evaluate ground water impacts of an electronics manufacturing facility in Florida, a nitrate plant in Indiana and a chromate processing facility in New Jersey.

Decommissioned a pond used to store the water and sludge from testing a well with radioactive water. Subsequently, was able to dispose of the sludge on-site successfully terminating the radioactive materials license.

Designed and supervised drilling program to assist in the evaluation of ground water contamination from a landfill and the evaluation of saltwater intrusion on Long Island, New York.

Performed mine dewatering and mine discharge studies for existing and proposed facilities in Louisiana, Colorado, and Wyoming.

Designed, performed and interpreted pumping tests and evaluated the long term yield of municipal wells in unconsolidated material, sedimentary formations and fracture controlled formations throughout the United States.

Performed numerous pumping tests and was the on-site hydrogeologist on the construction of a number of water wells ranging from 50 to 2200 feet deep

# George A. Krallis, Ph.D.



Dr. George A. Krallis provides consulting services to clients for water resource management and optimization from the standpoint of environmental, ecological, and economic benefit. He is currently performing hydraulic, hydrologic, and environmental impact assessment studies for electric utilities, mining, and oil & gas industries. He is also active in the application of the latest hydrodynamic, transport, and fate models to assess the impact of thermal, sediment, and pollutant discharges on aquatic resources in estuaries, rivers, lakes, and reservoirs.

Some of the models used are

- GEMSS®,
- GLLVHT,
- CE-QUAL-W2,
- HEC-HMS,
- HEC-RAS,
- WSPRO,
- PSRM,
- TR-20,
- TR-55,
- SWMM,
- DR3M,
- KYPIPE,
- CE-QUAL-R1,
- RIV1,
- QUAL-2E,
- CORMIX.

## Registration

- Professional Engineer (Civil) Massachusetts, 1994
- Professional Hydrologist, American Institute of Hydrology, 2004

## Fields of Competence

- Hydraulic and Hydrologic studies
- Hydraulic and Hydrologic modeling
- Water Quality
- Sediment transport

## Education

- Ph.D. (Civil Engineering), Lehigh University, Bethlehem, Pennsylvania
- M.S. (Civil Engineering), The Pennsylvania State University, University Park, Pennsylvania
- B.S. (Civil Engineering), Lehigh University, Bethlehem, Pennsylvania

## Key Projects

### **Suralco Nassau Plateau Bauxite Mine, Suriname.**

Performed hydrology and stream flow assessment for streams feeding Paramaka Creek. Evaluated effects of water reallocation on stream habitat and completed water management alternatives analysis. Evaluated field data collection network and performed QA/QC on data. Developed precipitation statistical analysis.

**Guyana Goldfields Inc, Guyana.** Proposed development of mining operations on the Cuyuni River in Guyana. ERM is preparing environmental and social impact management plans and guidelines for closure plans for the facilities that conform to IFC Performance Standards, Guyana Environmental Protection Agency (EPA) guidelines, and regulations recently promulgated by the Guyana Geology and Mines Commission. One aspect of the ongoing project is to apply predictive modeling to determine the concentration and extent of a potential cyanide plume due to an accidental cyanide spill from the mining facility and to assess potential impacts to surrounding aquatic habitats due to the accidental spill. The analysis uses the 1-D hydrodynamic and transport module of GEMSS®.

### **El Cerrejon Coal Mine Expansion Project,**

**Colombia.** The primary objective of this project was to review the Environmental and Social Impact Assessment report and other related documents for the proposed mine expansion. The expansion involves the relocation of approximately 20 km of the Rancheria River. ERM reviewed the documents for adequacy and compliance with international best management practices (IFC and Equator Principles) and Colombian regulations and standards. ERM

identified gaps in the documents, conclusions not supported by the ESIA, and conclusions not supported by international best practices. ERM also provided recommendations regarding additional field studies, model calibration, management and monitoring programs, and action plans to meet international standards.

**Pacific Hydro, Chile.** ERM performed a third party review of the 110 MW Chacayes Hydroelectric Plant in Chile, based on IFC Performance Standards, Equator Principles, and Chilean regulations. Specific tasks included evaluation of the hydrologic and hydraulic environmental impact assessments and gap analyses.

**Bui Development Secretariat, Black Volta River.** The purpose of this project was to assess potential environmental impacts associated with the construction and operation of the Bui Project, a hydroelectric dam project located on the Black Volta River in western Ghana. Potential water quality and sedimentation impacts in the reservoir, and an un-seasonal water level regime in the river downstream were identified as issues that warranted further investigation. ERM undertook basic reservoir and downstream river modeling studies to quantify the nature and extent of these potential impacts for presentation in the final EIA report. Methods included HEC-RAS modeling of the downstream reach, a Vollenweider-type assessment of the eutrophic level of the proposed reservoir, and a sediment balance to determine reservoir filling rates.

**EIA/SIA Studies, Nam Sane 3 Hydroelectric Power Project, Xieng Khouang Province, Laos PDR.** The scope of work for this project was to perform hydrologic and water quality assessments of this proposed hydroelectric dam and reservoir in Laos. The key hydrologic and water quality impacts identified were changes in water temperature, dissolved oxygen, and sediment in the reservoir and in the reach downstream of the powerhouse, as well as the impacts of changes in the flow regime in the bypass reach and downstream of the powerhouse. A minimum riparian release was proposed in the analysis to maintain existing aquatic ecology and mitigate overall environmental, health, and social impacts.

**World Bank, Trung Son Reservoir CE-QUAL-W2 Model Application and Software Training, Vietnam** Trung Son Reservoir is a proposed hydroelectric power project on the Trung Son River in central Vietnam for Vietnam Electric Utility (EVU). The client requested assistance with development and training with the 2-dimensional hydrodynamic and water quality model, CE-QUAL-W2. The goal was to assess the water quality of the proposed reservoir and the management options for clearing the flooded areas. The technology transfer took place as a 6-day intensive workshop presented in Nha Trang, Vietnam. The workshop achieved two objectives: the model was fully customized to the Tung Son Reservoir problem definition, and the client

(fifteen engineers and scientists) were trained in the use and theory of the model.

**Near-field Discharge Modeling, Jaguar, Guatemala.** Cooling tower blowdown water from the proposed Jaguar Energy Power Generating project in Guatemala is to be discharged into La Mora River. ERM evaluated several preliminary discharge structure configurations using CORMIX as part of the effort to ensure the ESIA meets IFC Performance Standards and Equator Principles. The simulations were run to compute the dilution rate and the plume size (width and length) and stream cross section blockage potential for various ambient flow rates. The discharge consisted primarily of a thermal component. Results of the simulations consisted of plume maps and dilution curves for the various discharge structure designs and ambient flow rates.

**Thermal Discharge Modeling, Aguirre Electric Generating Station, Jobos Bay, Puerto Rico.** The purpose of this study was to evaluate the impact of cooling water intakes on the entrainment of aquatic organisms and to estimate the extent and orientation of the thermal plume. A three dimensional hydrothermal model, GEMSS®, coupled with ENM (Entrainment Module), a spreadsheet based model capable of modeling several entrainment regions, was used to demonstrate the existing impacts of the plant operation on the indigenous population. Analysis of the thermal plume showed that the discharge was within the EPA, World Bank, and Puerto Rico Water Quality Standards. The entrainment study estimated the increase in the species mortality due to the intake structure operation to be as much as 35%.

# Romina Aramburu

Senior Environmental Consultant



Romina is a Senior Environmental Consultant with ERM based in the Washington DC office with 8 years of experience. She joined ERM Peru in 2003 and was transferred to DC in 2007.

As an Environmental Engineer, Romina has worked in numerous environmental, health and socioeconomic impact assessments; environmental audits; third party Equator Principle reviews; and sustainable development strategies for projects in socio-economically and environmentally complex regions (i.e., Offshore and Coastal Desert, Amazon Rainforest, Middle East). She has worked for the oil & gas, electricity, hydropower and mining sectors in Argentina, Bolivia, Brasil, Colombia, Costa Rica, Chile, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua, Panama, Peru, Iraq and the US.

Her work out of the Washington, DC office has been focused on developing sustainable environmental and socioeconomic strategies for project financing (i.e., under Equator Principles and /or IFC Performance Standards) as well as conducting ESIA to international standards for the private sector and multilateral institutions and providing training on Equator Principles and IFC Performance Standards.

Romina is fluent in English and Spanish.

In addition, Romina is the Health & Safety Leader for the Washington DC office.

## Fields of Competence

- Impact Assessment and Planning
- Third Party Review - Multilaterals/ Financial institutions
- Environmental Audits - Due Diligence
- Environmental Management Systems (ISO 14000)
- Sustainable Development
- Conservation of Biodiversity and Natural Resources

## Education

- Environmental Engineer. Faculty of Science. National Agrarian University, La Molina. Lima, Peru. November 2004 - November 2005. Top 5%. *Cum Laude*.
- Specialization Program on Environmental and Quality Management and Auditing Diploma. National Agrarian University, La Molina. Lima, Peru. April - October 2004. Top 5%.
- Bachelor in Science - Environmental Engineering. Faculty of Science. National Agrarian University, La Molina. Lima, Peru. March 1998 - December 2002. Top 5%. *Cum Laude*.

## Languages

- Spanish (native)
- English (fluent)
- French (conversational)

## Memberships

- Peruvian Board of Professional Engineers (CIP #86284)
- American Chamber of Commerce in Lima (AmCham)
- Society of Petroleum Engineers (# 3437095)

## Key Projects

### ERM MidAtlantic. Senior Environmental Consultant. 2007 - present

- Lead Environmental Specialist for an ongoing Quarterly Independent Supervision Monitoring of an 85 MW Pando and Monte Lirio Hydropower Plants in Chiriqui, Panama, sponsored by Electron Investments S.A. For DEG, IFC, IDB and CAF. November 2010 - ongoing.
- Environmental Reviewer for the Environmental and Social Due Diligence of the 58 MW Bajo Frio Hydropower Project in Chiriqui, Panama. DEG, November 2010.
- Support to the Environmental and Social Group at the Inter-American Development Bank (IDB) for private sector projects. Senior review of the Environmental and Social Strategy (ESS) prior to Board approval for the 405-MW Porce IV Hydropower Project in Medellin, Colombia. October 2009.
- Project Manager for an ongoing Quarterly Third Party Equator Principle Supervision Monitoring of a 110 MW Chacayes Hydroelectric Plant in Chile, sponsored by Pacific Hydro Chile. Group of four EPPF's led by Credit Agricole CIB. April 2009 - ongoing.
- Project Manager for an ongoing Quarterly Independent Supervision Monitoring of a 200 km Red Vial 4 Toll Road from Trujillo to Casma in Coastal Peru, sponsored by Odebrecht. CAF and Credit Agricole CIB. November 2010 - ongoing.
- Environmental Specialist for an Environmental and Social Assessment of the SIEPAC Transmission Line Project in Panama, Guatemala and El Salvador against IDB Safeguard Policies. IDB - ESG, September 2010.
- Lead Trainer on Equator Principles and IFC Performance Standards for CIFI Staff. CIFI, November 2010.
- Lead Trainer on IFC Performance Standards for OPIC Staff with focus on PS3 Pollution Prevention and Abatement and PS6 Biodiversity. OPIC, September 2010.
- Project Manager for providing support in the Review of Annual Monitoring Reports (AMRs) in the Global Manufacturing Department. IFC, August 2010.
- Updated lender Due Diligence Assessment against Peruvian Regulations and Equator Principles for 520-MW Gas-Fired Fenix Power Plant in Chilca, Peru. July 2010.
- Project Manager for the Development of IFC's Financial Intermediaries (FI) Website Content for a Sustainability Toolkit for IFC's clients. IFC, May 2010.
- Project Manager for a Corporate Sustainability Benchmarking Study of the IFC and World Bank against 10 similar organizations. World Bank Group. April 2010.
- Environmental specialist for a Third Party Equator Principle Review against IFC Performance Standards for a 2400-MW Ituango Hydropower Plan and Dam in Medellin, Colombia. Grupo Santander. March 2010.
- Project Manager for a Third Party Equator Principle Review against IFC Performance Standards for a large Wastewater Treatment Plant in Atotonilco de Hidalgo, Mexico. Credit Agricole - CIB. March 2010.
- Project Manager for an Environmental and Social Due Diligence and Risk Assessment for a for a 750-MW Hydropower Plant and Dam in Ayacucho, Peru. Norsk Hydro. February 2010.
- Project Manager for a Gap Analysis and Action Plan against Equator Principle and IFC Performance Standards for a Hydropower Plant and Dam in Ayacucho, Peru and Preliminary Social Risk Assessment. Norsk Hydro. November 2009.
- Project Manager for a Third Party Equator Principle Review for the Red Vial 4 Highway in Peru. Calyon and CAF. October 2009.
- Project Manager for an Environmental and Social Bankability Assessment prior to the Third Party Review against Equator Principles for the financing of 150-km Megantoni Loop from Malvinas to Kepashiato in Peru and Training Workshop on Equator Principles and IFC Performance Standards. Transportadora de Gas del Peru. June 2009.
- Support to the Environmental and Social Group at the Inter-American Development Bank (IDB) for public sector projects. Developed the

Environmental and Social Management Report (ESMR) for the Misicuni Power Plant in Cochabamba, Bolivia and the ESMR for the Coca Codo Sinclair Hydropower Plant in Ecuador. October 2009.

- Support to the World Bank in facilitating and developing a Toolkit “Towards Sustainable Decommissioning of Oil Fields and Mines: A Toolkit to Assist Government Agencies” and stakeholder workshops for input and improvement. The World Bank. January 2009 – ongoing.
- Project Manager for a Third Party Equator Principle Review and IFC Performance Standard compliance for a Thermal Power Plant in Panama. Generadora del Atlántico (GENA). June 2009 - ongoing.
- Project Manager for a Third Party Equator Principle Review and IFC Performance Standard of a Dam and Hydroelectric Plant in Nicaragua. IFC and EGENICSA. June 2009 - ongoing.
- Advisor for the ESIA of an Ammonium Nitrate Plant in San Juan de Marcona, Peru to ensure compliance with Equator Principles and IFC Performance Standards. Orica Mining. June 2009.
- Project Manager for a Third Party Equator Principle Review of 110 MW Chacayes Hydroelectric Plant in Chile, sponsored by Pacific Hydro Chile. Group of six EPFI’s. November 2008 – April 2009.
- Lead Trainer on Equator Principles and IFC Performance Standards for several large mines in Chile, including Kinross, Barrick and Cerro Casale. March 2009.
- Environmental Lead for an Environmental and Socioeconomic Baseline Study in Northwest Iraq. Confidential client. February 2009 – present.
- Research consultant for an Ecological Restoration and Remediation Plan in Block 8, Northern Amazon Region, Peru. Pluspetrol Norte. December 2008 – January 2009.
- Lead Auditor for a Phase I Environmental Audit to HGM in Lima Peru for HP worldwide. Hewlett-Packard. October 2008.
- Project Manager for the development of an Air Dispersion modeling (AERMOD) and Sea Water Thermal Modeling (CORMIX) for a 520MW gas fired power plant in Chilca, Peru. Fenix Power Peru S.A. August 2008 – October 2008.
- Project Manager for a Third Party Equator Principle review of the ESIA of a 520MW gas fired power plant in Chilca, Peru under IFC PS, Equator Principles and Peruvian regulations. Fenix Power Peru S.A. July 2008 – October 2008.
- Project Manager for an Environmental and Social Impact Assessment of a 300MW Coal Fired Power Plant in Guatemala – Project Jaguar in coordination with a Guatemalan consultant, ERM’s role was to ensure the ESIA meets IFC Performance Standards and Equator Principles. AEI Services LLC. March 2008 – March 2009.
- Project Manager for the development of an Environmental and Social Management Framework (ESMF) for the Information Technology Industry Development in Mexico, under World Bank Operational Policy standards. The World Bank Group. October 2007 – May 2008.
- Project Manager for the development of an Environmental and Social Management Framework (ESMF) for the Telecommunication Sector Modernization Project in Costa Rica, under World Bank Operational Policy standards. The World Bank Group. June 2007 – May 2008.
- Team member for a Third Party ESIA Review and gap analysis with IFC Performance Standards. Confidential Client, Mining Sector Colombia. December 2007.
- H&S Officer for Technical Assistance in Context of Hydroelectric Projects in Mexico, La Yesca Site. For the private sector of the Inter American Development Bank (IDB). November 2007.
- QA/QC review for the Environmental Assessment of nine paint retail sites in Mexico. Confidential client. October 2007.
- Project Manager for Phase I Environmental Assessment under Equator Principles for four hydroelectric plants in La Oroya, Peru. Confidential client. August 2007.
- Project Coordinator for an Environmental, Social and Health Impact Assessment for the Seismic Exploration in Block 104, Northern Amazon Basin, Peru. ESIA was designed to be IFC compliant as well as to meet Peruvian



regulations. ConocoPhillips. January 2007 – May 2008.

#### **ERM Peru. Consultant.**

##### **2003 - 2007**

- Phase I Environmental Assessment for two sites in Talara and Iquitos, Peru. Schlumberger. February 2007.
- Project Coordinator for a Health, Safety, Environment (EHS) and Sustainable Development (SD) Assessment and Other Technical Services in Peru; within the assessment program for assets in Colombia, Peru, Ecuador and Argentina. Confidential client. August 2006 – December 2006.
- Health and Safety Leader for ERM Peru OpCo, with the following activities: H&S training and induction; implement and monitor ERM 33 H&S Standards; maintain I&I monthly reports; projects and fieldwork HASP development with Project Managers; annual H&S office inspection; coordination with Global H&S team. June 2006 – February 2007.
- Team Coordinator for Corporate Advisory Services (CAS) in updating and improving Environmental Management Plans for Camisea Block 56 in accordance with the IADB standards and comments made by local authorities prior to beginning operations at Block 56. Pluspetrol Peru Corporation. May 2006 – September 2006.
- Project Coordinator for the EIA of a Sodium Cyanide Plant in Callao. Orica Peru S.A., May 2006 – September 2006.
- Project Coordinator to consolidate information in the TGP Contingency Action Plans for KP50+900 Vilcabamba, KP126+000 Echarate and KP200+700 Tocate, Peru, based on the agreement signed with the IADB. The study included the following tasks: (i) Consolidate spill impact assessments on physical factors; (ii) Consolidate spill impact assessments on social factors; (iii) consolidate contingency plan assessment developed during spillage. Transportadora de Gas del Perú S.A., August 2006.
- Auditor for Phase I Vendor Due Diligence in an Animal Nutrition Premix Plant, within an audit Program in 24 countries, led by ERM Germany. Confidential client. June 2006.
- Presentation of Mathematical Model for disposing of drilling mud and cuttings at sea and for marine seismic noise in Block Z-6 in order to obtain permits from DICAPI. Petro-Tech Peruana. June 2006.
- Project Coordinator for Participatory Diagnose Workshops in the fieldwork phase for the EIA of an Exploratory Perforation and 2D - 3D Seismic Survey Project in Block Z-6. Petro-Tech Peruana. January 2006.
- Project Coordinator for an Environmental Impact Assessment of an Exploratory Perforation and 2D - 3D Seismic Survey Project in Block Z-6. Petro-Tech Peruana. November 2005 to date.
- Supervision of a Complementary Archaeological Evaluation of the EIA for a Gas Pipeline and Compression Station in Talara Piura, Peru. Petro-Tech Peruana. October, 2005.
- Supervision and reporting for a Phase II Soil and Groundwater Characterization Study. Pedernales, Manabí, Ecuador. Confidential client. September 2005.
- Risk Assessment of two Alternatives for Disposal of Bilgewater and Sewage from Cargo Ships at the Marine Terminal of the Camisea Project. Pluspetrol Perú Corporation. August, 2005.
- Phase I and Phase II Environmental Baseline Assessment for 48 service stations in Ecuador. Confidential client. June – September 2005.
- Environmental Impact Assessment for a Gas Pipeline and Compression Station in Talara. Petro-Tech Peruana S.A. July, 2005.
- Phase I and Phase II Environmental Baseline Assessment for 16 service stations in Ecuador. Confidential client. April 2005 – ongoing.
- Environmental Management Plans for the Exploration and Exploitation Projects of two Oil Fields in the Amazon Region. Pluspetrol Norte S.A. February, 2005.
- Phase I Environmental Site Assessment for a Pharmaceutical company. Confidential client. February, 2005.
- Hydrobiological and Fishing Monitoring Program in the High and Lower Urubamba Region for Pluspetrol Peru Corporation S.A. and Transportadora de Gas del Peru. December 2004 – ongoing.

- Transition Phase Monitoring Program for the Off Shore Component at the Fractionation Plant of Natural Gas and Marine Terminal, Playa Lobería, Pisco, Perú. September 2004 – ongoing.
- Documentation upgrading and updating, satisfactory to the Inter American Development Bank standards and workshops assistance for the loan to the downstream component of the Camisea Project. March – December 2004.
- Environmental Monitoring and Environmental Management System for the exploration project Block 90. REPSOL YPF. October - December 2004.
- Audits to the Environmental Management System in the Fractionation Plant of Natural Gas, Playa Lobería, Pisco. Pluspetrol Perú Corporation. October 2004.
- Phase I and Phase II reports for service stations assessments in Peru. Confidential client. September – November 2004.
- House-style team for the upgrading of reports and formats within the company. ERM Peru. March 2004 – February 2005.
- EIA & EIS for Block 56 Oil field in the Lower Urubamba Region. Pluspetrol Peru Corporation S.A. February – November 2004.
- Monitoring Program for the Off Shore Component at the Fractionation Plant of Natural Gas and Marine Terminal, Playa Lobería, Pisco, Perú. Pluspetrol Peru Corporation S.A. September 2003 – August 2004.

### Seminars and Conferences Given

- Technical Presentation at the 10 SPE International Conference on Health, Safety & Environment in Oil and Gas Exploration and Production. Author and Presenter. “Working with Stakeholders to Develop a Toolkit to Guide Planning and Implementation of Decommissioning and Closure Schemes in Resource-Rich Countries”. April 12-14 2010. Río de Janeiro, Brazil.
- Seminar “*Collpa* Use by Macaw and Parrot Species on the Tambopata River: Environmental Factors that Influence a Site” Catholic University Peru, General Studies. May 20, 2002.

### Publications

- A. D. Rawa, SPE, Millennium Challenge Corporation; E. Mayorga Alba and C. C. Sheldon, World Bank; R. Aramburu, SPE, Environmental Resources Management; and F. D. Rodriguez, SPE, HSE-International LLC. Working with Stakeholders to Develop a Toolkit to Guide Planning and Implementation of Decommissioning and Closure Schemes in Resource-Rich Countries. SPE-126763-PP. Prepared for the XII HSE Conference in Rio de Janeiro. April 2010. Society of Petroleum Engineers.
- Brightsmith, D.J. and Aramburu, R. 2002. Avian Geophagy in Peru. Abstract Submission for the Third North American Ornithological Conference. Sept. 2003. New Orleans, Louisiana.
- Brightsmith, D.J. and Aramburu M.N., R. 2004. Avian Geophagy and Soil Characteristics in Southeastern Peru. BIOTROPICA. Vol. 36, Issue 4, Pgs. 534-543.
- Aramburu, R.; Echevarría, E. y Salazar, L. 2005. A Cleaner Production Program Initiative at MAFRINSA Slaughterhouse. To obtain the Title of Environmental Engineer. National Agrarian University, La Molina. Honors (*Cum Laude*).

# Andres Meglioli, Ph.D., MBA

Partner



Dr. Andres Meglioli is a Partner with ERM based in Denver, Colorado. He has over 24 years of experience in environmental and geologic consulting with an emphasis on mine reclamation and closure, AMD treatment, mine permitting, pipeline assessment, refinery cleanup, hydrocarbon investigation and remediation, site characterization, water supply, and risk assessment, management and quantification.

Dr. Meglioli has worked as an underground mining geologist in Argentina and in mining exploration in Argentina and Norway. He has prepared aquifer protection permit applications for copper mining operations in Arizona, and numerous cost analyses for mine reclamation, reclamation bonds cost estimates, and closure/post-closure for active and inactive mines throughout the US, Canada, and New Zealand. Mining assessments included compliance audits, environmental audits and assessments, and environmental insurance surveys. He developed the technical guidelines used by one of the world's largest insurance corporations to conduct mine reclamation work, including risk assessment, environmental insurance underwriting, and reclamation bond replacement for mining operations in North and South America.

Dr. Meglioli's experience in the mining sector includes three years of managing the water treatment facility and underground collection system of the acid mine drainage in Iron Mountain Mine in northern California, commonly considered one of the world's most acidic mine drainages. He recently prepared the closure guidelines for a large multi-national zinc corporation. The guidelines include risk identification and management, sustainable closure and post-closure analysis, and post-closure care and monitoring.

Dr. Meglioli is currently the technical director on the preparation of the closure plans for one of the world's largest coal mines in Colombia. During the last year he conducted closure reviews for mining operations in Mongolia, Scotland, Namibia, Peru, California, and Nevada. Closure planning includes reviews of post mining sustainable land use, stakeholder and community relations, water management, cost modeling, and risk analyses. He is also experienced in the assessment of glaciers and rock glaciers in Andean regions.

He also leads the HSEC audit program of several mines for an international mining copper firm in Latin America. He has conducted numerous environmental audits and phase I and II assessments domestically and internationally of mining operations, industrial parks, and manufacturing plants. Dr. Meglioli is an accomplished leader working on start-up, growth, and optimization of global projects and business development strategies in environmental platforms. He has a strong reputation for results achieved through combined global business and project expertise, multilingual fluency, and a Ph.D. in Geological Sciences and an MBA in Global Management.

## Professional Affiliations & Registrations

- Registered Professional Geologist, Arizona, Pennsylvania, Argentina
- Member, Geological Society of America
- Member, American Institute of Professional Geologists (AIPG)
- Member, Colorado Mining Association

## Fields of Competence

- Mine closure and reclamation cost estimates
- Environmental audits and risk management of mining, refineries, and pipelines for the environmental insurance industry

## Education

- M.B.A Global Management., University of Phoenix, Arizona, 2003
- PhD Geology., Lehigh University, Bethlehem, Pennsylvania, 1992
- B.Sc., Geology, San Juan State University, Argentina, 1984

## Languages

- English
- Spanish (fluent – native language)
- Portuguese (solid working knowledge)

## Publications

- Nazaryk, P., and Meglioli, A., 2009. Development of a Health, Safety, Environmental, and Community (HSEC) Management System and How Its Implementation Can Benefit the Uranium Mining Industry. U2009, Keystone, Colorado.
- Un-permitting a Mine – or Demonstrating Successful Completion of Reclamation Permit Requirements. Meglioli, A; Trippel, A., Corbetta, P., and Taylor, M.; 2009 Society of Mining, Metallurgy, and Exploration, Inc (SME), Denver, Colorado, USA.
- Demsey, K., Meglioli, A., Biggs, T., Pearthree, P., 1998. Surficial Geology and Geomorphology of Central Saucedo Valley, Goldwater Air Force Range, Southern Arizona. Arizona Geological Survey – Open File Report.
- Meglioli, A., 1997, Geologic Map of Surficial Deposits. Waterboro 7-1/2 minute quadrangle, Maine. GOGEMAP Project – Maine Geological Survey.
- Meglioli, A., 1997, Geologic Map of Surficial Deposits. Limington 7-1/2 minute quadrangle, Maine. GOGEMAP Project – Maine Geological Survey.
- Meglioli, A., 1997, Geologic Map of Surficial Deposits. Mousam Lake 7-1/2 minute quadrangle, Maine. GOGEMAP Project – Maine Geological Survey.
- Meglioli, A., 1995, Aquifer Map 38, Maine Geological Survey.
- Meglioli, A., 1994, Geological map of surficial deposits. Milton 7-1/2 minute quadrangle, Maine. GOGEMAP Project – Maine Geological Survey.
- Bolduc, A., Thompson, W., Meglioli, A., 1989, Surficial Geological map of North Windham 7-1/2 minute quadrangle, Maine. GOGEMAP Project – Maine Geological Survey.

## Key Projects

Honored with Meritorious Services Award and US Environmental Protection Agency commendation letter for outstanding performance and orchestration of large-scale federal project acid mine drainage treatment (Iron Mountain, CA).

Technical director for the development of the mine closure plan of one of the world's largest coal mines in northern Colombia. Closure plan included water management issues, sustainable vision for closure and post-closure management, stakeholder consultations, and cost estimating. Facilities include, large open pits, rail lines, roadways, airports, camp, and maritime ports.

Developed mining guidelines for environmental risk assessment of numerous reclamation projects for American International Group (AIG). The guidelines are currently used by the environmental underwriting, risk finance, re-insurance and global energy underwriting and financial arms of AIG. Additionally developed all technical guidelines for use by applicants and brokerage firms.

Developed the corporate closure guidelines for a large international zinc corporation. Guidelines include risk identification and management tools, cost estimating, sustainable closure and post-closure care and monitoring procedures.

Coordinated, supervised, and evaluated environmental exposures and closure and post closure and monitoring costs for mining properties in Nevada, Idaho, Alaska, Arizona, New Mexico, California, Colorado, Wyoming, Washington, Montana, South Dakota, Utah, Yukon, Colombia, Peru, Chile, Namibia, Scotland, Mongolia, and New Zealand.

Conducted and orchestrated environmental insurance surveys in hard rock open pit and underground mines (gold/silver/molybdenum/copper/cobalt/lead/uranium), and for coal mines in Utah, West Virginia, and Wyoming.

Managed the water treatment operation for more than three years of what is considered one of the world's most acidic mine drainage (Iron Mtn., CA). Management responsibilities include contracting, reporting to state and federal reporting agencies, health and safety compliance, geotechnical analysis, and personnel management (internal and contractors).

Developed costing scenarios, including preparation of risk profiles, to statistically evaluate project feasibility for more than seventy mining operations and over twenty large pipeline and refinery operations for multi-million finite insurance transactions.

Slashed 5% of \$6.5M project's expenditures, garnering an additional 25% in projected savings, by identifying and recommending alternative treatment options.

Contributed to prospective acquisitions of Latin American real estate through account relations, environmental legal and regulatory evaluations, and site survey completions.

Established market presence for the first time for large environmental consulting firms in Brazil, Mexico, and Venezuela through strategic partnerships. Scope of services covered landfarming of petroleum-impacted soils (Venezuela), and remediation of multiple metal and organic compound impacted sites in Brazil and Mexico for large multi-national corporations.

Pioneered introduction of Remediation Management program that generated \$11M in account growth, eliminated project resource expenditures, and tightened controls over complex, multi-year environmental remediation projects.

Established mining and petroleum and gas pipeline engineering underwriting guidelines to enhance identification and control of acceptable risks and avoid unacceptable risks.

Led evaluation of mining reclamation and oil and pipeline projects through staffing strategy development and execution of recruitment, training, and management of technical teams.

Recommended enhancements to statistical model used for risk profiling and evaluation that introduced flexibility to environmental insurance underwriting pricing tool and enhanced competitiveness in pricing and services.

Designed site characterization, remedy design and implementation for the cleanup of a foundry site with multiple contaminant plumes impacting several aquifers in Arizona. Responsibilities included remedy design, report preparation, client and regulatory interaction, well design and installation, and budgeting.

Successfully won bid to design and install numerous deep water supply wells in Mexico plants for a U.S. beverage company by orchestrating bid process and preparing bilingual reports.

Introduced project management portfolio management structure that optimized cross-functional team structure and streamlined client relations.

Technical Director responsible for the control and implementation of environmental mitigation measures associated with the expansion of the Panama Canal.

Technical Director for the site characterization and remedy selection for pesticide impacted soil and groundwater industrial site in Colombia.

Conducted hundreds of reviews to estimate reclamation costs for mining operations with emphasis on reclamation bond placement and the use of environmental insurance to secure proper closure and post-closure procedures for national and international mining operations. Prepared closure plans for large coal and hardrock operations.

Designed and implemented aquifer protection permits (APP) for mines in Arizona.

Participated in geochemical sampling and mining exploration projects throughout western and southern Argentina, Svalbard (Norway), and southwestern Arizona.

Annex B

## Public Meeting Record

## 1 PUBLIC MEETING RECORD PARAMARIBO

Meeting held on August 17, 2011 in Hotel Krasnapolsky, Paramaribo. Meeting was conducted in Dutch.

Presenters included:

- Mr. Ryan Kamble, HSLP Coordinator Surgold
- Mr. Radjkoemar Sandjietsingh, Head Geologist Merian Gold Project
- Mr. Rutger de Wolf, ERM representative
- Mr. Salomon Emanuels, ERM representative

Programma

- Welkomstwoord
- Introductie/huisregels/agenda
- Project beschrijving
- Milieu studie
- Sociale studie
- Vragen en antwoorden
- Afsluiting
- Samen zijn

Welkomstwoord – Hr. *Kamble*, HSLP Coördinator Surgold

Namens Surgold heet dhr. Kamble de aanwezigen van harte welkom.

Aangegeven wordt dat het bij deze om de eerste van drie ontmoetingen gaat.

De volgende publieke ontmoeting wordt op Moengo gehouden en de laatste op Langa Tabiki.

Voorts wordt aangegeven dat de aanwezigen tijdens deze bijeenkomst zelf in de gelegenheid worden gesteld input te geven in de vorm van het stellen van vragen. Er worden notulen gemaakt van de bijeenkomst en die zullen over enige tijd ter beschikking zijn.

Na instructies gegeven te hebben in geval van calamiteiten, neemt dhr. Kamble de basisregels en de agenda door.

WAT IS HET MERIAN GOLD PROJECT? – hr. *Radjkoemar Sandjietsingh*,  
*Head Geologist Merian Gold Project*

Hoofdpunten van de presentatie:

- Wie is Surgold?
  - Een bedrijf van Newmont & Alcoa met Newmont als de manager
  - Exploreert in het Merian gebied sinds 2004 -> nog geen goudproductie
  - Nog geen goudproductie – in afwachting van overeenkomst met de overheid
- Projectlocatie
- Projectonderdelen
- Machineriën -> hydraulische graafmachines, haul trucks, dozers, graders, loaders

- Project werknemers:
  - Ongeveer 1,500-2,000 tijdens constructie (inclusief tijdelijke contractors gebruikt voor constructie)
  - Ongeveer 900 tijdens operations
- Afval van het project -> vast en vloeibaar afval. Vast afval is afkomstig uit de mijn en wordt getransporteerd naar een waste rock storage (2x). Dit afval zal geen schade aan het milieu toebrengen en zal ook geen zure drainagesystemen tot gevolg hebben. Vloeibaar afval wordt getransporteerd naar een tailing storage facility. Er zullen dammen gebouwd worden en water dat zich in de vijver heeft verzameld zal teruggepompt worden, welke deels gezuiverd zal worden en deels na reiniging in het milieu geloofdst zal worden
- Verwerkings diagram -> er zal met cyanide en koolstof gewerkt worden om het goud uit het gesteente te halen. Er zal sprake zijn van een recovery van 97%.
- Transport materialen -> tijdens de constructiefase en het mijnen zullen er materialen worden geïmporteerd en voor al het geïmporteerd materiaal zal gebruik gemaakt worden van de Haven. Het transport zal plaatsvinden via de Oost-West verbinding naar Moengo en van daaruit wordt het verder getransporteerd naar Langa Tabiki. De weg wordt door Surgold in orde gemaakt en van Langa Tabiki naar Moengo wordt er een weg van 60 km aangelegd
- Sluiting van de mijn
- Voorbeelden van mijnsluitingen Indonesie

MILIEU- EN SOCIALE EFFECTEN STUDIE (MER / ESIA) – *Rutger de Wolf*, ERM

Hoofdpunten van de presentatie:

- Wat is een ESIA?
- Vier onderdelen van een ESIA -> milieu, gezondheid, sociaal, stakeholder consultation
- Wie voert de ESIA uit? -> Environmental Resources Management (ERM)
- De rol van ERM
- Wat zijn de vereisten voor een ESIA?
- Wat omvat een ESIA?
- Milieustudies:
  - Grondwater: hoe lopen de stromen en wat kan er veranderen wanneer het project wordt uitgevoerd?
  - Luchtkwaliteit: meten van chemicaliën en deeltjes in de lucht en nagegaan wordt hoe het e.e.a. zou kunnen gaan veranderen
  - Geluid: kijken naar huidige geluidsniveau's, wat kan je verwachten en welke maatregelen kunnen getroffen worden
  - Bomen en planten: nagegaan wordt of er bijzondere planten aanwezig zijn, of het gaat om kwetsbare ecosystemen en hoe de negatieve effecten gemitigeerd kunnen worden
  - Dieren: verschillende experts zullen een inventaris maken en nagaan of er kwetsbare of bedreigde diersoorten aanwezig zijn
  - Verkeer: de intensiteit, onveilige situaties en eventuele toename daarvan na opstarten van het project



- Kwaliteit oppervlakte water: welke invloeden zullen de opslagfaciliteiten hebben op de waterlopen in die gebieden
- Studiegebied voor milieustudies

## SOCIALE- EN GEZONDHEIDSSTUDIES – *Salomon Emanuels*

### Hoofdpunten van de presentatie:

- In de dorpen die mogelijk beïnvloed worden door het project:
  - Huishoud enquêtes
  - Interviews en focus groep discussies
  - Volksgezondheidsstudies
- ➔ Start: september 2011
- Studiegebied voor de sociale- en gezondheidssituatie
  - gebied rondom de mijn
  - strook langs de weg -> Moengo tot Paramaribo
  - Paramakaanse dorpen
- Publieke consultatie
  - Mensen zullen hun meningen kunnen geven -> rapporten worden gedistribueerd naar groepen/organisaties die hun mening kunnen geven. NIMOS zal een advies uitbrengen
  - Consultatie principes: alles omvattend, transparant, met aandacht voor o.a. cultuur & levensonderhoud
- Review en publicatie van ESIA bevindingen
- ESIA ToR verkrijgbaar bij:
  - Surgold Kantoor - Paramaribo (Suriname Straat)
  - NIMOS kantoor – Paramaribo
  - Surgold Kamp – Merian

### Volgende stappen:

- Sociaal & Cultureel Erfenis onderzoek
- Ecologisch onderzoek
- Belangstellenden geïnformeerd houden
- Slot bijeenkomst tegen April 2012

### Slot opmerkingen

- ESIA moet afgerond zijn voordat exploitatie rechten door de regering is uitgegeven
- ESIA is belangrijk voor de Project ontwikkeling
- U zal de gelegenheid krijgen om te participeren
- De reultaten van de ESIA zullen gepresenteerd worden, zodat uw opmerkingen kunnen worden meegenomen.

### VRAGENRONDE

#### Hr. Courtar (namens de Minister van ATM):

- Hij vindt het jammer dat het publiek een gelimiteerde tijd heeft om vragen te stellen

- De uitnodiging was verwarrend; hij dacht dat het gezondheidsaspect uitgebreid naar voren zou komen. Waarom is dat aspect niet uitgebreid meegenomen in de presentatie?
- Zal er geleerd worden van de best practices en lessons learned van Iamgold?

Hr. Salomons: het gezondheidsaspect is inderdaad niet uitvoerig behandeld, wat niet betekent dat het minder belangrijk is. De gezondheidsaspecten zullen tijdens de ESIA uitvoerig onderzocht worden door o.m. informatie op te vragen bij de poliklinieken en rapporten te bestuderen. Ook de mensen zal naar hun gezondheidssituatie gevraagd worden.

Hr. Courtar: wat zal precies onderzocht worden?

Hr. Emanuels: onderzocht zal worden wat de gezondheidssituatie van de mensen op dit moment is voor wat betreft veel voorkomende ziekten. Voorts zal het voedingspatroon onderzocht worden en welke invloed het minder jagen zal hebben op dat voedingspatroon. Ook op welke manier mensen gezondheidszorg bereiken zal onderzocht worden.

Hr. Meyers: the health aspect is critical, both for the communities and the workers. Surgold will work according to international standards. Part of the directive is not to only look at the risks, but what the opportunities are to improve people's and the worker's health and safety. This is the scoping stage and health is mentioned in the TOR, which document is available.

Hr. Courtar: zal men in conclaaf gaan met Iamgold om met elkaar de worst constraints te bespreken?

Hr. Kamble: het wiel hoeft niet opnieuw uitgevonden te worden en er kan van elkaar geleerd worden van Iamgold; op dit moment is er een goed contact met ze.

Hr. Boejoekoe (burger van Suriname): er worden milieustudies gedaan teneinde te voorkomen dat het milieu beschadigd wordt; is er een instantie die vanwege de overheid toezicht zal houden op het geheel?

Hr. Meyers: mijnsluiting is een cruciaal aspect van een mijnoperatie en alvorens over te gaan tot exploitatie, wordt er nagegaan hoe de sluiting van de mijn moet plaatsvinden. Voordat gekeken wordt naar de ecologische aspecten, wordt eerst gekeken naar de baseline situatie (huidige situatie). Jammergenoeg voor dit project is er in het gebied al heel veel verstoring, nog voordat ze kunnen werken. Er zijn wat voordelen voor mensen die aan kleinschalige mijnbouw doen, maar het heeft de ecologie van het gebied behoorlijk aangetast. Wanneer we praten over het ontwikkelen en sluiten van de mijn, moet eerst nagegaan worden hoe de huidige verstoring verbeterd kan worden. Er is een groot verschil tussen kleinschalige- en industriële mijnbouw. Bij de industriële mijnbouw wordt vanaf het begin gekeken naar het sluitingsaspect en welke de beste mogelijkheden zijn voor rehabilitatie. Er zijn voorbeelden getoond van gebieden waar de rehabilitatie heeft plaatsgevonden en die gebieden hebben dezelfde ecologische omstandigheden als Suriname.

Hr. Boejoekoe: welk orgaan zal het e.e.a. monitoren?

Hr. de Wolf: uiteraard zal het bedrijf zelf monitoren, maar men bedoelt een externe organisatie. Het NIMOS zou dat het beste kunnen doen. Er is een milieuwet in de maak, maar die is nog niet door de DNA gekomen. NIMOS heeft onvoldoende mandaat om zaken goed te controleren, maar hij denkt wel dat NIMOS zo goed als mogelijk probeert zaken te monitoren.

Mw. Babb (NIMOS): bij zulke grote projecten moet de monitoring vanuit een commissie van de overheid gebeuren. Onafhankelijk van de overheidsmonitoring, heeft NIMOS altijd contact met de bedrijven.

Mw. Simson (Moiwana Mensenrechtenorganisatie):

- Er is gepraat over chemicaliën zoals koolstof en cyanide; zijn dat de enige chemicaliën die gebruikt zullen worden?
- Waaruit bestaat het vloeibaar afval?
- Hoe secuur zullen de dammen zijn die het vloeibaar afval moeten tegenhouden?
- Wat zal er met het vloeibaar afval gebeuren na sluiting van de mijn?

Hr. Sandjietsingh:

- Bij het verwerken van het gesteente wordt gebruik gemaakt van cyanide en koolstof. De concentratie die uiteindelijk in het milieu terecht komt zal niet schadelijk zijn. Door zonlicht valt cyanide uiteen in koolstof en stikstof
- Ten aanzien van de veiligheid van de dammen is het zo dat er tijdens het mijnen steeds onderzoeken worden uitgevoerd teneinde na te gaan of er lekkages zijn.

Hr. Meyers:

- mijnmaatschappijen hebben behoorlijk wat problemen gehad in het verleden en daarom zijn er bepaalde benaderingen en wordt nagegaan welke de beste is. Bekend is de internationale cyanide code die richtlijnen voorschrijft over alles dat met cyanide te maken heeft. De code is samengesteld door een prominente groep van wetenschappers en omvat alle fasen, te weten transport, opslag, gebruik en vernietiging. Newmont is één van de medeondertekenaars van de code en moet zich aan de regels houden. Op de opslag zal er regelmatig controle uitgevoerd worden en een vereiste is dat de resultaten van die controle openbaar gemaakt moeten worden.
- ten aanzien van de veiligheid en stabiliteit van de dammen is het zo dat Golder, een prominent bedrijf op dat gebied, de dammen zal ontwerpen volgens internationale standaarden.

Mw. Simson: zij vindt het antwoord niet afdoende. Het komt erop neer dat nadat Newmont is vertrokken, er een blijvend meer van chemicaliën achterblijft?

Hr. Meyers: dat is juist. Er zal afval zijn, maar het zal voornamelijk bestaan uit gesteente waarin er geen goud is. Voordat het afval wordt gebracht naar het meer, wordt de cyanide erin vernietigd. Nadat het water is gezuiverd, zal het drinkbaar zijn voor dieren.

Mw. Simson: is het drinkbaar voor mensen?

Hr. Meyers: hij zou het niet drinken. Water that is released from the tailing facilities will be safe for human consumption.

Mw. Simson: will there be question of active rehabilitation (replanting) or will there be question of letting plants grow again by themselves?

Hr. Meyers: vanwege de ecologische omstandigheden in Suriname, zal er naast actieve herbeplanting sprake zijn van een natuurlijke regeneratie.

Mw. MacIntosch (NH):

- zijn er maatregelen (rampenplannen) gereed in geval van een dambreuk bij een tailing point?
- hoe zal het opwekken van electriciteit ten behoeven van de plant geschieden?
- gezegd is dat er een nieuwe weg wordt aangelegd; is er een studie gedaan over de impact daarvan op flora en fauna?

Hr. Sandjiet Singh: voor de aanleg van de weg worden er studies gedaan en dat is onderdeel van de ESIA.

Hr. de Wolf:

- de bouw van de weg is onderdeel van de te uitvoeren studie
- ten aanzien van de dammen zullen zaken onderzocht worden en aanbevelingen gedaan worden

Mr. Kirk Schmidt (GM Surgold): het bedrijf moet haar eigen electriciteit opwekken en die opwekking zal op het project zelf geschieden middels heavy fuel oil of diesel. Studies hebben uitgewezen dat Suriname over onvoldoende capaciteit beschikt om zo een grote activiteit uit te voeren.

Hr. Meyers:

- hij wil benadrukken dat Newmont zich zal houden aan de internationale cyanide code en iedereen is welkom die te bestuderen.
- ten aanzien van rampenplannen is het milieubeheerplan onderdeel van de ESIA. Alle lokaties waar er zich grond- en oppervlaktewater bevindt, zullen gecontroleerd worden. Indien bij een controle blijkt dat er problemen zijn, zullen er bepaalde rampenplannen zijn zoals bijvoorbeeld het meteen terugvoeren van het water naar de opslagplaats.

Mw. Hermien Geykhorst:

- bij het vermalen van rotsmateriaal komt er fijn poeder vrij die zich overal verplaatst. Thans zijn er hele grote half vloeïende meren die heel erg gevaarlijk zijn omdat de bovenkant hard is, maar daaronder vloeibaar en het 't effect heeft van drijfzand.
- Zij denkt niet dat de gebieden zich snel gaan herstellen. Niet omdat het groen zal zijn, betekent het dat het hersteld is en zij denkt dat er toch heel veel aan flora en fauna verloren zal gaan.

Hr. de Wolf: in het gebied is er al heel veel verstoord en je zal het niet in de originele staat terug kunnen brengen, maar er zal wel gepoogd worden dat

zoveel mogelijk te doen. Surgold is absoluut niet voornemens om rommel achter te laten.

Hr. Kirk Schmidt: de kleinschalige mijnbouw heeft veel schade aangericht en zij zullen naar methoden zoeken hoe de huidige vervuiling verwijderd kan worden, waarna nagegaan zal worden of er goud aanwezig is. De kosten voor het verwijderen van de huidige vervuiling zullen heel hoog liggen.

Hr. Jabini:

- Indien het ESIA rapport negatief is, zal het project doorgaan?
- Wordt de weg Langa Tabiki een bauxiet- of asfaltweg; wat houdt de upgrade in?
- Is er sprake van FPIC (free prior informed consent)? Worden de mensen werkelijk geïnformeerd wat de impact is van de activiteiten op hun leven en wel in hun eigen taal en eigen situatie?
- Kleinschalige mijnbouwers hebben veel schade aangericht en dat moet meegenomen worden. Wat zal er met hen gebeuren? Worden ze contracters of zal men ze door laten gaan met het beschadigen van het milieu? Is er een policy met betrekking tot het betrekken van de mannen bij het werken met betere systemen?
- Zullen de gemeenschappen vergoed worden voor de grote offers die ze moeten brengen? Wordt er een fonds in het leven geroepen?

Hr. de Wolf:

- Indien het rapport negatief is, zou het theoretisch gezien gestopt kunnen worden, maar in de praktijk is dat niet zo. Nagegaan wordt hoe de negatieve effecten gemitigeerd kunnen worden. Het ligt uiteindelijk aan Surgold zelf om op basis van de rapporten te beslissen wat zij wil doen. De overheid kan ook aangeven wat hun eigen ideeën zijn en wat voor overeenkomst het wil sluiten met Surgold.
- Het project heeft ook vele positieve effecten zoals de ontwikkeling van het gebied, de ontwikkeling van het land en werkgelegenheid.

Hr. Emanuels:

- ten aanzien van de informatie naar de gemeenschappen toe en FPIC is het bedrijf met de Surinaamse overheid in gesprek om te komen tot het doen van zaken. Het toepassen van het principe van FPIC is juist iets dat de overheid zou moeten aangrijpen om te doen. Toen Granman Levi nog in leven was, heeft het geprobeerd de mensen in het gebied te informeren. Ook is een persoon aangetrokken om het contact met de lokale gemeenschappen te onderhouden.
- Er zijn bijeenkomsten gepland op Langa Tabiki en Moengo en hij zelf is een paar keer bij de Granman geweest. Er vindt regelmatig informatieuitwisseling plaats tussen het bedrijf en de lokale gemeenschappen. Heel in het begin zijn er zelfs commissies daartoe ingesteld.

Hr. Jabini: het bedrijf is er medeverantwoordelijk voor om de mensen vooraf te informeren. Lessons learned van Iamgold zouden meegenomen moeten worden en een behoorlijk deel van de opbrengsten moet terugvloeien naar de gemeenschappen. Zal er een fonds opgericht worden?

Hr. Asadang:

- gekeken wordt wat er met de lokale goudzoekers zal gebeuren en samen met de overheid wordt gekeken naar een duurzame oplossing van het probleem. Het is niet de bedoeling dat ze daar steeds worden weggehaald, maar dat ze daar kunnen doorwerken en wel op een verantwoorde manier en daarmee een inkomen hebben. Het is wel belangrijk van hen te vernemen wat ze willen. Evenwel is het niet duidelijk met wie er gesproken moet worden want er zijn diverse organisaties.
- In het gebied zal er na het opstarten van de activiteiten werkgelegenheid ontstaan en er zal zoveel mogelijk met lokale mensen gewerkt worden. Ook zullen lokale mensen aangezet worden tot het opzetten van toeleveringsbedrijven en daartoe zal hun capaciteit versterkt worden. Eerdergenoemde zaken zullen maken dat een deel van het geld in het gebied achterblijft.
- Alhoewel het bedrijf nog niet verdient, wordt er nu al in de gemeenschap geïnvesteerd, zoals financiële ondersteuning voor de best geslaagden. Er zal een fonds opgezet worden, zoals dat in de andere landen is gebeurd.

Hr. Johannes **Tojo**: zal er met bestaande organisaties in het gebied gewerkt worden? Hij heeft rare ervaringen met het bedrijf. Hun organisatie is een regionale organisatie van de dorpen en ze hadden zich aangemeld bij het bedrijf teneinde een bijdrage te leveren aan de sociale organisatie, maar ze zijn genegeerd.

Hr. Asadang: Surgold wil zeer zeker met iedereen samenwerken. Wijlen Granman Levi had een platform opgezet en wat Surgold graag wil is een platform opzetten waarin elk segment van de samenleving is vertegenwoordigd. Geen enkele organisatie moet uitgesloten worden, want Surgold is er niet om tweedracht te zaaien.

Hr. Courtar: geeft het advies om het gezag van het traditioneel gezag niet te ondermijnen; er moeten geen mensen tegen elkaar uitgespeeld worden.

Hr. Asadang: in het platform hebben er kapiteins zitting die door de mensen van de gemeenschappen zelf zijn aangewezen.

Hr. Courtar: hij ziet veel chaos en daarom adviseert hij het instituut van de Granman in stand te houden.

**AFSLUITING – hr. Kamble**

Door dhr. Kamble wordt aangegeven dat mensen alsnog hun op- en aanmerkingen kunnen doorgeven en belangrijk is dat men hun naam en telefoonnummer erbij vermeldt.

Alle aanwezigen worden namens Surgold van harte bedankt voor hun aanwezigheid en participatie.

Notulist: Cynthia Ashruf<sup>©</sup>

Box 1.1

*Paramaribo Record of Photographs*









A record was kept of all attendees and this is listed in Box 1.2 below

Box 1.2

Paramaribo Attendees

Paramaribo 11/0811 KAWONAPOLSKY FIRM

Naam	Adres/ Instansie	Telefoon/ Email	Handtekening
Machielsh Lylique		Angie_machielsh@hotmail.com	
Freek BILKERDijk		freek.BILKERDijk@simonccadSP	
Frankie Jan		Frankie Jan@hotmail.com	
Amato Jehudine		christidy.jenea@gmail.com	
John Courten	Sucadelaan 16	422240 C01u2000@yahoo	
Eddy FRANKEL	Pla Dr. H. Adhwastr 21	499649-116130 efranke@staatsie.com	
Hermine Galkhorst	Costerstraat 2g	421802 hermiengalkhorst@gmail.com	
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L.F. Meub	J.A. Pengel str 161	856312.	
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Amiet Bidda	Adel student		
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ESSEd. S		0074458@hotmail.com	
Machhar H	Vansustraat #4	Mafiz-han@hotmail.com	
Binda. WA	Lashkarweg #55 (kwarta)	amiet_86@hotmail.com	
Kreio, Servijs	Indraommedaant 39	kreio1@hotmail.com	S.L.
Johnan, Jan.	ADEK (student) Acceh stud/Unkl.	Shangjohnan@yahoo.com	



A meeting was held on August 18, 2011 in Recreatie Zaal, Moengo. The meeting was conducted in Dutch and Sranan Tongo.

Presenters included:

- Mr. Ryan Kamble, HSLP Coordinator Surgold
- Mr. Radjkoemar Sandjietsingh, Head Geologist Merian Gold Project
- Mr. Rutger de Wolf, ERM representative
- Mr. Salomon Emanuels, ERM representative

Meeting Agenda:

- Word of Welcome
- Introduction /ground rules/ agenda
- Project Description
- Environmental Assessment
- Social Assessments
- Questions and Answers
- Closure
- Get-together

*Word of Welcome and Introduction /ground rules/ agenda*

Mr. Kamble, HSLP Coordinator Surgold

Mr. Kamble welcomed the attendees on behalf of Surgold. He indicated that this is the second in a series of three meetings. The previous meeting was held in Paramaribo and the last public meeting will be in Langa Tabiki.

He indicated that everyone present at the meeting would have the opportunity to ask questions and provide input. Minutes of the meeting will be made publicly available.

Mr. Kamble then gave instructions in the case of an emergency and covered the ground rules and the meeting agenda.

*Project Description*

Mr. Radjkoemar Sandjietsingh, Head Geologist Merian Gold Project  
Main points of the presentation:

Who is Surgold?

- A subsidiary of Newmont & Alcoa that is managed by Newmont
- Surgold has explored in the Merian area since 2004 without gold production
- Surgold is awaiting an agreement with the government to begin gold production

Project site

- Project components
- Equipment -> hydraulic excavators, haul trucks, dozers, graders, loaders

Project employees:

- About 1,500-2,000 during the construction (including temporary contractors used for construction)
- About 900 during operations

Solid and liquid waste from the project:

Solid waste is generated from the mine and is transported to a waste rock storage. This waste will not cause damage to the environment and will not result in acid drainage systems. Liquid waste will be transported to a tailing storage facility. Dams will be built and water collected in the pond will be pumped back into the environment after purification.

Processing diagram:

Cyanide and carbon will be used to extract the gold from the rocks to achieve a recovery rate of 97%.

Transport materials:

During the Construction phase, the mining operations materials will be imported via the Port. Transport from the Port will take place via the East-West connecting road to Moengo and from there it will be further transported to Langa Tabiki. The road by Surgold will be upgraded and a 60 km road will be built from Langa Tabiki to Moengo.

Mine closure:

Examples of mine closures in Indonesia were provided.

### *Environmental and Social Impact Assessment*

Mr. Rutger de Wolf, ERM representative

Main points of the presentation:

What is an ESIA?:

- Four components of an ESIA - environment, health, social, stakeholder consultation
- Who conducts the ESIA? - Environmental Resources Management (ERM)
- The role of ERM
- The requirements for an ESIA?
- What an ESIA contains

Environmental assessments:

- Groundwater: evaluating watersheds and stream flows to see what can change during the project
- Air quality: measuring chemicals and particles in the air and examining how all this can change during the project

- Noise: examining the current noise levels, how the project will change these levels, and what measures can be taken to mitigate high noise levels
- Trees and plants: identifying any rare plants or vulnerable ecosystems in the project area and how to mitigate any negative effects
- Animals: experts to identify and inventory any threatened or endangered animal species
- Traffic: identify whether traffic will increase after starting the project and potentially introduce unsafe situations
- Quality surface: identify the impacts the storage facilities will have on the watercourses in those areas

#### *Social and Health Assessments*

Mr. Salomon Emanuels, representative of ERM

Main points of the presentation:

Studies will be conducted in villages potentially affected by the project and will include:

- Household surveys
- Interviews and focus group discussions
- Public health studies
- Start: September 2011

Study area for the social and health situation

- Area around the mine
- Strip along the road - Moengo to Paramaribo
- Paramaccan villages

Public consultation

- People will be able to state their opinions. Reports will be distributed to groups/organizations for their input. (NIMOS to advise)
- Consultation principles include a comprehensive and transparent process with a focus on culture and livelihood, among other things.

Review and publication of ESIA findings

The ESIA ToR will be available at the following places:

- Surgold office - Paramaribo (Surinamestraat)
- NIMOS office - Paramaribo
- Surgold camp - Merian

Next steps:

- Social & Cultural Heritage study
- Ecological study
- Keeping interested parties informed
- Final meeting around April 2012

Concluding remarks

- The ESIA must be completed before exploitation rights are granted by the government

- The ESIA is important for Project development
- You will have the opportunity to participate
- The results of the ESIA will be presented so that your comments can be incorporated.

#### *Questions and Answers Session*

1. Representative of the District commissioner

He requested that the process of information collection and all information be transparent.

Ryan Kambel

He replied that the ESIA process will be transparent.

2. Mariska Poese, representative of STEP

a. She asked how involved the MBO's or CBO's were in the ESIA process. She explained that her reason for asking this question was that there are organization such as PAS and STEP in Moengo that work with NGO's, CBO's, women's organizations, and youth organizations, and know the field very well. They could have an important contribution in this process.

b. She commented that the community of Moengo is interested in the ESIA process and employment. Most of the people are not educated or qualified to work for the company. She asked what the company will do to qualify people for the available jobs.

Salomon Emanuels

a. He said that during the development of stakeholder list, an invitation was sent to the coordinators of these NGO's in Moengo. They should pass along the message. He said they will also take into consideration the idea of speaking with the different groups separately to gain individual input.

Santjitsing Radjkoemar

b. He mentioned that the position regarding employment has not been defined yet. As soon as information about employment is available it will be shared. He knows that the plan is to hire local people (Paramaccaners) as much as possible. It is possible that local people and people in Paramaribo may not meet the requirements for some positions; in such cases, the company will search for people abroad. He mentioned that currently the company has trained local people and people from Paramaribo and Moengo to work within the company.

3. Francis, representative of the organization "Kon mek wi Taki Makandi" (Let Us Talk Together).

a. She asked what approach Surgold would take if they come across valuable fauna and flora in the area of exploitation. She wanted to know if they would continue with the project.

b. She also asked what Surgold will mean for the local people in the Marowijne area.

Rutger de Wolf

a. He answered that these are reasons the ESIA is conducted. If they come across sensitive areas, protected animals and endangered species, specialists will give recommendations to Surgold to reduce the negative impact on these areas and species. At this time they cannot provide a specific answer on the presence of the above mentioned topics because they need to first do the research.

Wendell Asadang

b. He answered that Surgold will have a positive impact on the local people and that they will benefit from the project. There will be employment opportunities, and local people will be trained to set up businesses so they can provide goods to the company. It is possible that the company will not be able to buy all its necessary goods from the local people.

He explained that the company has its own way of operating. In other countries, Newmont developed a fund which aimed to develop the local community. When Newmont moves out of that country, the money in the fund will stay behind to develop the local community and the area. This fund has many requirements in place. One of these is an education requirement. The local people will be educated to survive in the community and as a result strengthen family development.

In the past three years, a scholarship was provided to the best student of the three primary schools located at Langa Tabiki, Nazon and Loka Loka, who successfully passed their exam. A male and a female were chosen and each received USD 1,000. Further, Surgold has provided USD 1,000 to set up a building at Langa Tabiki. The road from Moengo to Basecamp will be maintained constantly.

4. Representatives of the DC

a. He mentioned that he heard a lot about STEP and he wanted to know if STEP will control the benefits coming from the project in operation.

b. He also asked why only the students from the local community received a scholarship from Surgold.

Salomon Emanuels

a. He answered that the intention of the company is to involve all people and groups who will contribute positively to the company.

Wendell Asadang

b. He answered that the company presently prefers to support the local community close to the project. In the future when the company is in the production phase, more areas will probably receive support from the company.

5. Ramijatal Bouwliid,

a. She asked how big the boundary of the project is that Surgold will use to operate.

b. She stated that she is a teacher and asked what the possibility would be for her to work at one of the schools in the Paramacca area.

Ingrid Pradon

a. She answered that it was determined that the ESIA will be conducted for the ten villages along the Marowijne river, the community in the upper Commewijne area, the community along the road from Paramaribo to Moengo and the community along the road from Moengo to Langa Tabiki. The company will also look at the boundary referred to in the presentation.

Santjitsing Radjkoemar

a. He answered with additional information regarding the boundaries. Surgold will also work with the exploitation boundary, which covers an area of 18,000 ha. Of the 18,000 ha, 1,500 ha will be used to establish the mine and the facilities.

Salomon Emanuels

b. He answered that it is not the responsibility of the company to determine where teachers should teach. That decision is made by the government.

Mike Meyer

b. Mike added that through the ESIA process the company will identify the opportunity for social development. This will be done in collaboration with the local community, as they have been talked about the upper Marowijne area, the Paramacca area. He said that they also aim to have better understanding of what is needed for the camp during operation. At this time they only expect a camp for workers, not for families. It is expected that the majority of people would come from the local community to work and return to their family when the work is completed.

6. Ms. Simone Betterson

a. She states that she understand that the ESIA is about three topics, which are environment, social and health. However, she did not see evidence of anyone from the three responsible ministries involved in collaboration during the ESIA process. She recommended involving these three ministries in the ESIA process.

Salomon Emanuels

He commented that overall, during the ESIA process, most of the answers to people's questions will become clear and will be provided to the community.



*Box 2.1*

*Moengo Record of Photographs*







A meeting was held on August 19, 2011 in Krutu Oso, Langa Tabiki. The meeting was conducted in Dutch, Sranan Tongo, Pamaka and Aucaans.

The presenters included:

- Mr. Wendell Asadang, HSLP Coordinator Surgold
- Mr. Radjkoemar Sandjitsingh, Head Geologist Merian Gold Project
- Mr. Rutger de Wolf, ERM representative
- Mr. Salomon Emanuels, ERM representative

The presentation component of the meeting was the same as in Paramaribo and Moengo, and thus has not been repeated here.

*Questions and Answers Session*

1. Mr. Adrean Adawde

a. Mr. Adrean mentioned that Mr. Salomon and Santjitsing stated in their presentation that the government will determine what should be included in the deal with Newmont. He stated that the government will determine this, but it is also important that the local community provide input. He thought that three-pronged collaboration between the government, the company and the local community was lacking. He stated that this is not the mistake of the company, because he saw their presence since 2004 frequently in the area.

b. He also stated that the company will start mining in 2014. He asked Surgold to establish a training centre to train the local people, which would be a good opportunity for people in the local community to develop themselves and have a better chance to be employed.

c. He continued saying that Santjitsing mentioned that the project will be operated 24 hours per day. He noted that this fact would change the situation in the community because the men will be away from their wives and the wives will receive less farming support from the men.

d. He suggested that Surgold take a delegation of the local community to another part of the world where Newmont operates so that they might see how the companies operate.

e. He also asked if the road that Newmont plans to build from Moengo to Langa Tabiki could be used by the local community.

f. He asked if Surgold will come back to present the findings of the ESIA study and whether the local community will have input into the final ESIA report.



g. He also stated that most of the local people are collecting rainwater for use in big tanks, but when the project starts, they will not be able to do that anymore because of the large amount of dust that will be created.

h. He also asked if local people will be involved in the environmental baseline studies.

Salomon Emanuels

a-g. He answered that all of these questions will be covered in the ESIA process and the road could be used by local community. ERM will come back to present the findings of the ESIA in April 2012 and the ESIA report will also be available for review.

Rutger de Wolf

h. He answered a local person by the name of Van Troon is involved in the flora study. There is a possibility that more Paramaccaners could be added to the group.

2. Redmond, Head of the primary school of Loka Loka

He states that the company gave the best student of the three primary schools at Langa Tabiki, Nazon and Loka Loka a scholarship of USD 1,000 to continue their studies in Paramaribo. He says that they received the money once and it was not enough for them to finish their studies in Paramaribo. He requested that the company continue to provide these students with a scholarship every year, if they are making progress, in order to motivate the students to continue doing their best.

Wendell Asadang

He said that this request will be communicated further.

3. Adam Ceder, entrepreneur

He stated that he speaks on behalf of the community. Granman Levi guaranteed the local community that the community could exploit gold in the Paramaccaans area and sell the gold to the Central Bank of Suriname and so the community did. Since they moved the porknockers from the Gowtu Bergi area, they had promised to build a road for the porknockers but that offer is still pending.

He also mentioned that there are a lot of military in the area and the community is discontent with that. He requested that the military be removed from the area.

Wendell Asadang

He stated that the company will work together with the local community and he thinks that this is really the time. This will ensure that everyone has voice and prevent different people from showing up as representatives of the local community.

He stated that the company does not have control over where the police operate. He also stated that at this time, there are no military in the camp.

4. Mr. Johannes Amouten, entrepreneur

He acknowledged the move of the porkknockers out of the area. He confirmed that they promised to build a road so that the porkknockers can continue with their activity.

5. Johannes Toyo.

He mentioned that the community always wants to work with the company.

Ezechiel, captain

He requested that the local community be involved in the process of dealing with the government and also with opportunities for the porkknockers.

Box 3.1

*Langa Tabiki Record of Photographs*







A record was kept of all attendees and this is listed in Box 3.2 below

Box 3.2

Langa Tabiki Attendees

PUBLIC MEETING 14/10/11

*dorp*

	Naam	Adres / <del>Wijk</del>	Telefoon / Email	Handtekening
1	Diederik Walter Jozef	Nason	82 63 588 / 84 93 310	
2	Ceder Adam Edin	Langatabiki	88 45 200	
3	AUGENSE Sidins			
4	TAPPA JOHN	KRIKI-MOTTO	8669062	
5	TAPPA THOMAS	" "		Tappa Th
6	SANNA Johannes	" "		SANNA
7	ABOEKA BAJAN	TABIKI EDC	08759142	<del>SANNA</del>
8	M. Lemens	Fabiki ede	08616408	M. Lemens
9	EDSON	LAGATABIKI	898837	E.A.
10	Deel			
11	af-Sa			
12	Sebe			
13	Ada da J	Musa Melan	8505357	
14	Ceder J	Skintabiki	8598852	
15	Hsaid J. O	Skintabiki	8144818	Hsaid J
16	me kang C. A	Langatabiki	8927793	C.A.
17	Clemens R	nason	8277110	Clemens R
18	Trina Antonius	kikimof	8532390	Trina
19	Johannes	Langatabiki	8894497	Johannes
20	Dina Pente	nason	8128611	Pente D.
21	Abri M.	Nason	8679006	Abri
22	Masansa Filomena	Skintabiki		M.A.S.A.
23	Tojo Johannes	Alem Sa	08540126	Tojo
24	Abri Johannes	Nason	8148898	Abri
25	Abri Johannes	Nason	18183493	Abri
26	Abri da Jendaka	Pol.		
27	Chorus Louisa	Jotis	8819749	aluria te 71581
28	Ameran Afaido	" "	8905391	Ameran 61
29	ASALORE	Am "		AMERAN
30	Juan 8785869	BIMAF0		
31	PEECIS			

	Naam	Adres	Telefoon / Email	Handtekening
32	ASALOBIE MAX.	Langatabetje	8859485	M. <del>ASA</del>
33	William	Saba	8848688	
34	M. Babel	AKATI, Langatab.	8951663	<del>ASA</del>
35	O. JON-AKON	RARA AMARIBO		<del>ASA</del>
36	M. Dasse - Alimoenadi	PARAMARIBO		<del>ASA</del>
37	R. Ramsukul	Paramaribo		<del>ASA</del>
38	S. Fioe	Paramaribo		<del>ASA</del>
39	Sanna - Marijje	Langatabetje		
40	Redmond, Paul	Hola-Hola school	8242611 / 8041516	P. Redmond
41	Kamilie - Golewin	Paramaribo	8944460	<del>ASA</del>
42	AL	Silvi		
43	Ceder. Renaldo	Atemsa	8251499	Ceder. R
44	Joels	Saba	8120032	
45	Benny / Corinne	Corinne Atemsa	0099469082503	<del>ASA</del>
46	van de <del>COE</del> Joyce	Atemsa	004028481	<del>ASA</del>
47	LONDA Atrante	Atemsa	06949488-CEL	<del>ASA</del>
48	Adoengga Eommen	Atemsa	8983444	
49	Gidins Hellyna	Atemsa	8709204	X
50	Cedore Luerik	Atemsa		
51	Cedore Naitino	Atemsa	8814857	
52	Cedore Chelma	Atemsa		
53	Toyo IS	Sungul		<del>ASA</del>
54	A. Gouw - SMITH	Saba		
55	KAPT. Bando	Langatabetje		
56	JAVINDE Ewert	Langatabetje	8512686	
u.	Jama Lucas	Saba		
u.	Frans Boiboi	Atemsa		
u.	KAPT. Ndada	Palura Tabitu		

In addition to these public meetings, Surgold and ERM conducted two separate internal presentations, to assure that Surgold employees, as part of the community, understood the ESIA process and the way the project will be developed.

Surgold recognised that their employees have the capacity to communicate to their families, friends and neighbours, to further disseminate information to the public.

The presentation component of the meeting was the same as in Paramaribo and thus has not been repeated here.

*Questions and Answers Session*

Leysner, SEMC.

a. He asked if Surgold has a system in place to repair the damage created by the porknockers.

Kirk Schmidt

a. He responded that garbage cleaning has taken place in the field, followed by the removal of scrap metal for recycling. The soil that contains gold will be taken to the processing plant from where it will be disposed for treatment. He stated that a group of engineers is working on this now.

Box 4.1

Internal Record of Photographs



Annex C

## Notifications of Public Meetings

Prior to the public meetings public notifications were made in public places and via the media informing a stakeholder of the times dates and locations. All notifications were made in Dutch, Sranan Tongo or other local languages.

*Box 1.1* lists the text that was used to announce the public meetings through the media.

**Box 1.1****Public Announcement Text**

Surgold invites all interested parties to attend public meetings to learn about the proposed Merian Gold Mining Project.

Surgold has commissioned Environmental Resources Management (ERM), an international environmental consultancy, to complete an independent study of the environmental, social and health impacts of the project. The Environmental, Social and Health Impact Assessment (ESHIA), carried out by ERM, will identify, reduce or avoid negative impacts and promote positive impacts. These meetings are a key element of the ongoing ESHIA and are being held to inform the public about the project and to invite them to ask questions and express their views.

The meetings will involve a presentation providing information about the project and the ESHIA process, and will discuss the avenues by which the public may seek further details or submit questions. Maps, informational brochures and the proposed methodology for the assessment will be available for review. Representatives of both Surgold and ERM will be present at the events.

We want to hear from you! Please join us at one of the following meetings:

Paramaribo | Wednesday 17 August 2011  
Hotel Krasnapolsky Conference Ballroom | 6.00PM - 9.00PM

Moengo | Thursday 18 August 2011  
Recreatie zaal | 3.00PM - 6.00PM

Langa Tabiki | Friday 19 August 2011  
Krutu Osu | 10.00AM - 1.00 PM

Learn about the Merian Project and let the Merian Project learn from you!

If you would like to attend one of these meetings but require transport, please contact Clausine Tjappa at (08831090).

For further details regarding the public meetings and the Project, please contact:

Wendell Asadang  
Community Relation Coordinator  
Email: [wendel.asadang@newmont.com](mailto:wendel.asadang@newmont.com)  
Tel: 8638655

*Table 1.1* lists the dates that this announcement was made in the local media.

**Table 1.1** *Public notifications*

Radio Station	Date announced	Newspaper	Date published
Radio 10	03-Aug	De ware Tijd	04-Aug
Radio Apintie	04-Aug	Times of Surinam	04-Aug
Skyradio	04-Aug	Dagblad	04-Aug
Radio Koyeba	04-Aug	De ware Tijd	04-Aug
Radio 10	10-Aug		
Radio Apintie	10-Aug		
Skyradio	10-Aug		
Radio Koyeba	10-Aug		

In addition to these public meetings written invitations were sent to key stakeholders and banners (see *Box 1.2*) and posters (see *Box 1.3*) were hung in relevant locations.

**Box 1.2** *Public Meeting Banners*







## Public Notice

### Surgold Merian Gold Project Public Meetings



Surgold invites all interested parties to attend public meetings to learn about the proposed Merian Gold Mining Project and associated Environmental, Social and Health Impact Assessment (ESHIA).

These public meetings are being held to inform the public about the project and to invite them to ask questions and express their views. The meetings will involve a presentation providing information about the project and the ESHIA process, and will discuss the avenues by which the public may seek further details or submit questions. Maps, informational brochures and the proposed methodology for the assessment will be available for review.



These meetings are a key element of the ongoing ESHIA which aims to identify, reduce or avoid negative impacts and promote positive impacts for the Merian Gold Project and affected communities.

Learn about the Merian Project and let the Merian Project learn from you!

If you would like to attend one of these meetings but require transport, please contact Clausine Tjappa (088311090).

For further details regarding the public meetings and the Project, please contact:

**Wendell Asadang**  
Community Relation Coordinator  
E: [wendel.asadang@newmont.com](mailto:wendel.asadang@newmont.com)  
T: 8638655

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Krutu Osu | 10.00AM – 1.00 PM

ERM consulting services worldwide [www.erm.com](http://www.erm.com)





Annex D

## Public Meeting Materials

In order to disseminate information regarding the ESIA and the Project flyers and presentations were prepared for stakeholders. All flyers and presentations were available in Dutch and English and the presentation slides were displayed in Dutch.

Box 2.1 shows the flyer available to stakeholders and shows the presentation given to stakeholders.

Box 1.1 Merian Flyer

**Merian Gold Project**  
August 2011

**SURGOLD**

This document provides information to help the public to understand the planned Merian Gold Project and the related impact assessment process.

**Project Background**  
What is the Project?  
Surgold is currently conducting a series of studies to examine the feasibility of the development of a gold mine in the area south of Moengo and north of the Nassau Mountains. The Project would involve the development of a gold mine and associated infrastructure in the Merian area and some upgrade of a transport route to Nieuwe Haven.

**WHO ARE SURGOLD?**  
Suriname Gold Company, LLC (Surgold) is a limited liability company held by Newmont Overseas Exploration Limited (Newmont) and Alcoa World Alumina LLC. Newmont is the manager of Surgold, and Surgold hold the Merian Right of Exploration where the Project is located.  
Surgold began exploration at Merian in 2004 and in 2007 applied for a right of exploration. They are about to start negotiations with the State to complete a Mineral Agreement that will set the conditions for the granting of exploitation rights, amongst other aspects.  
Surgold anticipate that, if approved, the Project would involve three open pit mines, a gold processing plant and other infrastructure such as waste rock storage areas, a tailings dam area to store liquid waste, and worker accommodation.  
In accordance with the directives of the National Institute of Environment and Development of Suriname (NIWOS) Surgold is required to prepare an Environmental and Social Impact Assessment (ESIA) for which Surgold has commissioned Environmental Resources Management (ERM), an independent international environmental consultancy. This study will seek to identify, reduce or avoid negative impacts and promote positive impacts to the local communities and environment.

**PROJECT ACTIVITIES**  
Expected Activities for the Project will include:

- Drilling and exploration activities
- Improvements to the transport route from the Merian site to Moengo
- Construction activities in the Merian area
- Mining activities once the project is approved
- Transport of Surgold staff and goods to and from Merian Camp, Paramaribo / Nieuwe Haven.

**ERM**

# Environmental and Social Impact Assessment Process

## What is the ESIA Process?

An Environmental, Social and Health Impact Assessment, or an ESIA, is a process to determine what effects a Project will have on people and the environment. The results of an ESIA are used to document potential impacts of a Project and the required mitigations. The impact assessment process will culminate in the development of a written ESIA report, which is a public document available to interested groups.



## What are the requirements for an ESIA?

In performing an ESIA, ERM will follow the guidelines of the National Institute of Environment and Development (NIMOS), international best practice and the Surgold business practices.

The main components of an ESIA are:

- characterize the existing environment;
- assess potential impacts and required mitigations; and
- engage potentially impacted groups.

To help ERM to understand the social and environmental conditions experts will visit the area and record their findings. ERM will use these findings to make their report.

## ESIA SCHEDULE

**STEP 1 - Feasibility Study (Exploration Activities)**  
Already Complete

**STEP 2 - Scoping Phase**  
March 2010 to August 2011  
(including public meetings)

**STEP 3 - Impact Assessment Phase**  
September 2011 to approximately May 2012 (studies and designing mitigation plan)

**STEP 4 - Disclosure Phase**  
approximately May 2012 to July 2012 (authorities and communities revision before ESIA approval)

## NIMOS ESIA PROCESS

### STEP 1 - Screening Phase

To establish if an ESIA is required. This has already been undertaken.

### STEP 2 - Scoping Phase

To gain a preliminary understanding of the project and help to focus the ESIA

### STEP 3 - Impact Assessment Phase

Conducting studies on the current environmental and social conditions in the area and the potential effects of the project.

### STEP 4 Disclosure Phase

Holding public meetings to discuss the findings with communities and interested groups.



Merian Project

## Involvement of Stakeholders

### What is a Stakeholder?

Any person who is affected by a project or who is interested in the project is known as a 'stakeholder'. Consultation with stakeholders is a crucial component of the ESI process.

#### STAKEHOLDER COMMENTS ON THE TERMS OF REFERENCE

ERM have developed a Terms of Reference for the ESI which describes the structure and detail of the planned studies in more detail. If you would like to see this document copies are available from:

- Surgold office on Suriname Straat (Paramaribo)
- NIMOS Office (Paramaribo)
- Surgold camp (Merani)



### CONSULTATION

**Participatory** – communication to involve stakeholders in the consultation process.

**Flexible** – the methods and techniques that will be used will be flexible and adapted to the changes and concern

**Culturally sensitive** – it is important to have a good understanding of the historical background of the area and the cultural and socio-cultural dynamics within the stakeholder groups.

**Transparent** – the process of consultation will be open and transparent. All comments and feedback will be recorded and attempts will be made to address them.



Villages along the Marowijne River



## How can I get involved?

### Where do I get more information?

Should you have any comments or concerns regarding the Project or any questions regarding the ESIA process, please contact the representative of Surgold below:

### How can I get involved?

The public consultation will take place throughout the ESIA process. ERM will consult the communities and other stakeholders in many ways during the ESIA process. If you would like to be involved please contact the Surgold representative below:

## We want to hear from you!

Wendell Asadang  
Community Relation Coordinator  
Email: [wendel.asadang@newmont.com](mailto:wendel.asadang@newmont.com)  
Tel: (0) 5978638655 / 5977172880

Salomon Emanuels  
ESIA representative for ERM  
E-mail: [salomonemanuels@yahoo.com](mailto:salomonemanuels@yahoo.com) / [merian\\_esia@erm.com](mailto:merian_esia@erm.com)  
Tel: +597-8553324



### PROPOSED STAKEHOLDER CONSULTATION METHODS

Public consultation will take place throughout the ESIA process including:

- Telephone interviews
- Public Meetings
- Small group meetings
- Individual interviews
- Household surveys
- Media announcements
- Release of documents
- Public comments



### Box 1.2 Merian Presentation





# Merian Gold Project

Environmental and Social Impact Assessment  
Public Meetings - August 2011



# Welcome & Introductions

## Purpose of Public Meeting:

- Inform interested groups about the Project
- Describe Merian Project
- Listen to your potential concerns

# Ground Rules

- Mutual respect, courtesy, and patience.
- Please help maintain an atmosphere where everyone feels comfortable and welcome.
- Please don't interrupt anyone while they are speaking.
- Please remain quiet so everyone can hear; please leave the room for side discussions.
- Please turn off cell phones or set them to vibrate.
- Raise hands to ask a question.



# Agenda

1. Project Description
2. The Environmental and Social Impact Assessment (ESIA)
3. Questions and Answers
4. Closing Remarks

# *Who Are Surgold?*

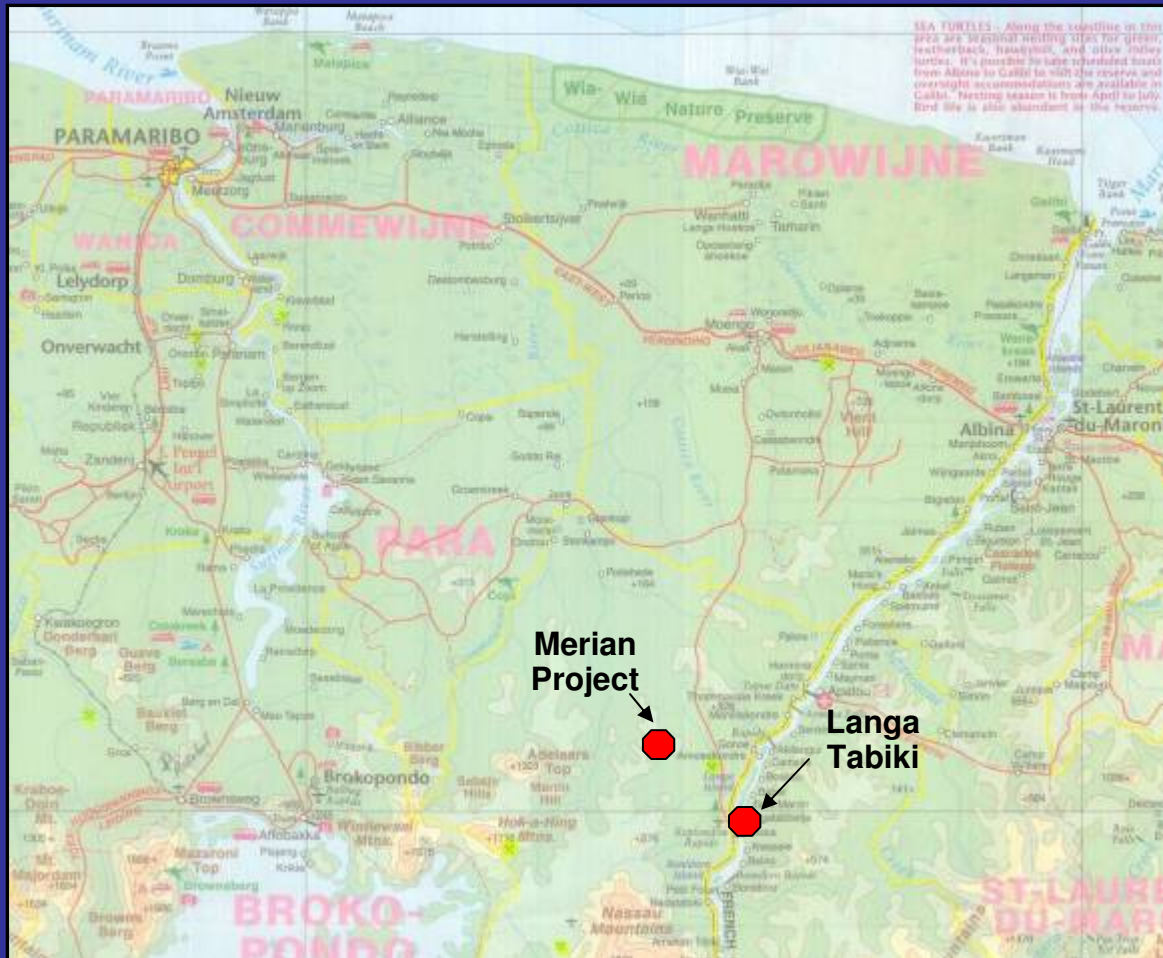
- A company held by Newmont & Alcoa with Newmont as the manager
- Exploring in Merian area since 2004
- No gold production yet – awaiting agreement with state



# What is the Merian Project?

## Project Location

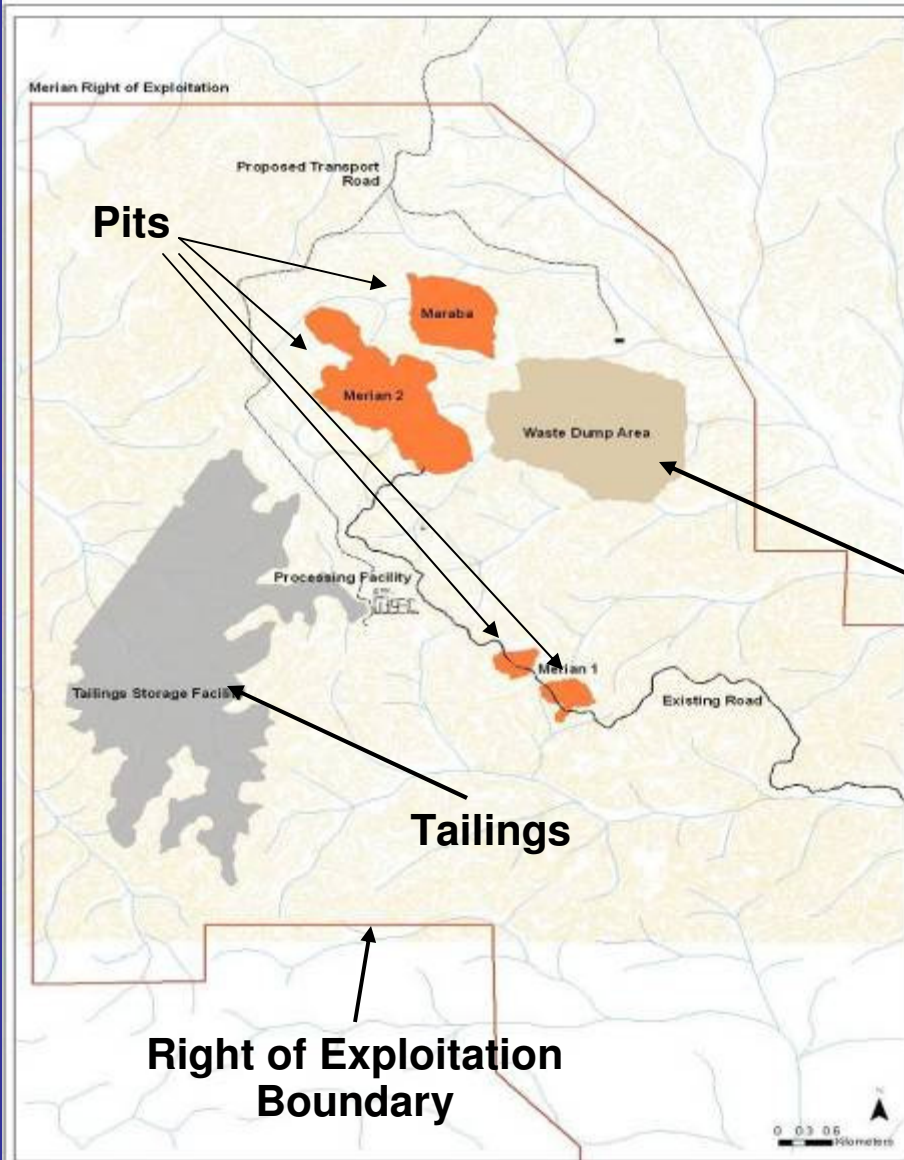
- Approximately 66km South of Moengo
- Between Commewijne and Marowijne Rivers
- Langa Tabiki is the nearest village (approximately 10km from site)
- Approximately 40km north of Nassau Mountains



# Project Components

The Project will need the following components:

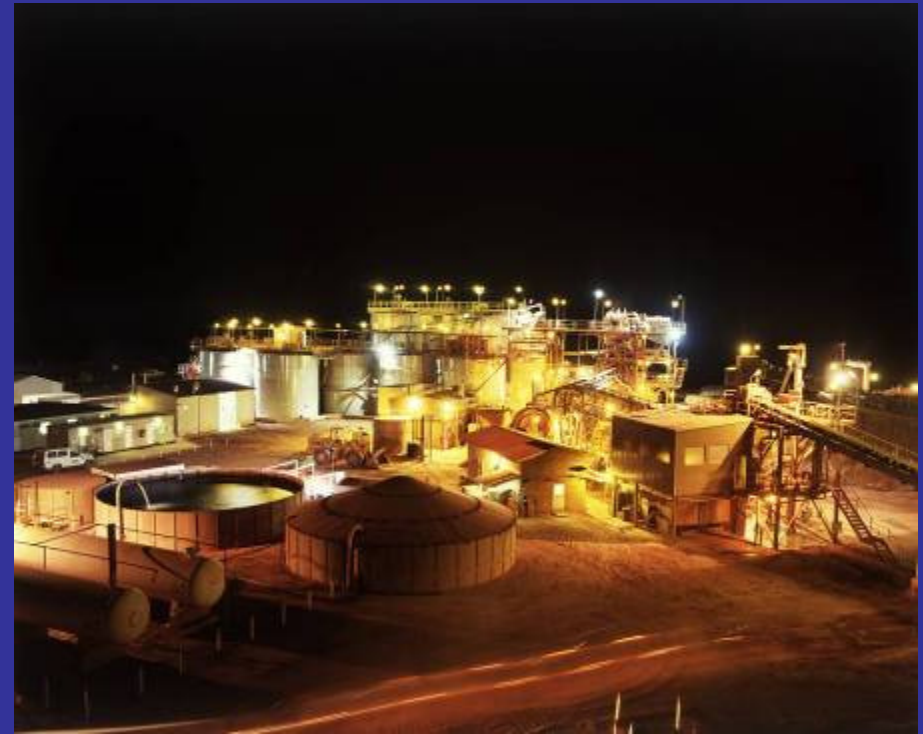
- 3 – 4 open pits
- Processing Plant
- Waste rock storage
- Tailing storage
- Power generation
- Water Treatment facilities
- Offices and accommodation





# Example Open Pit





## Examples of Processing

Above: example of gold processing plant

Left: example of leach tanks



# Example Machinery





# Waste from the Project

Above: example of waste rock storage

Below: example of tailings facility



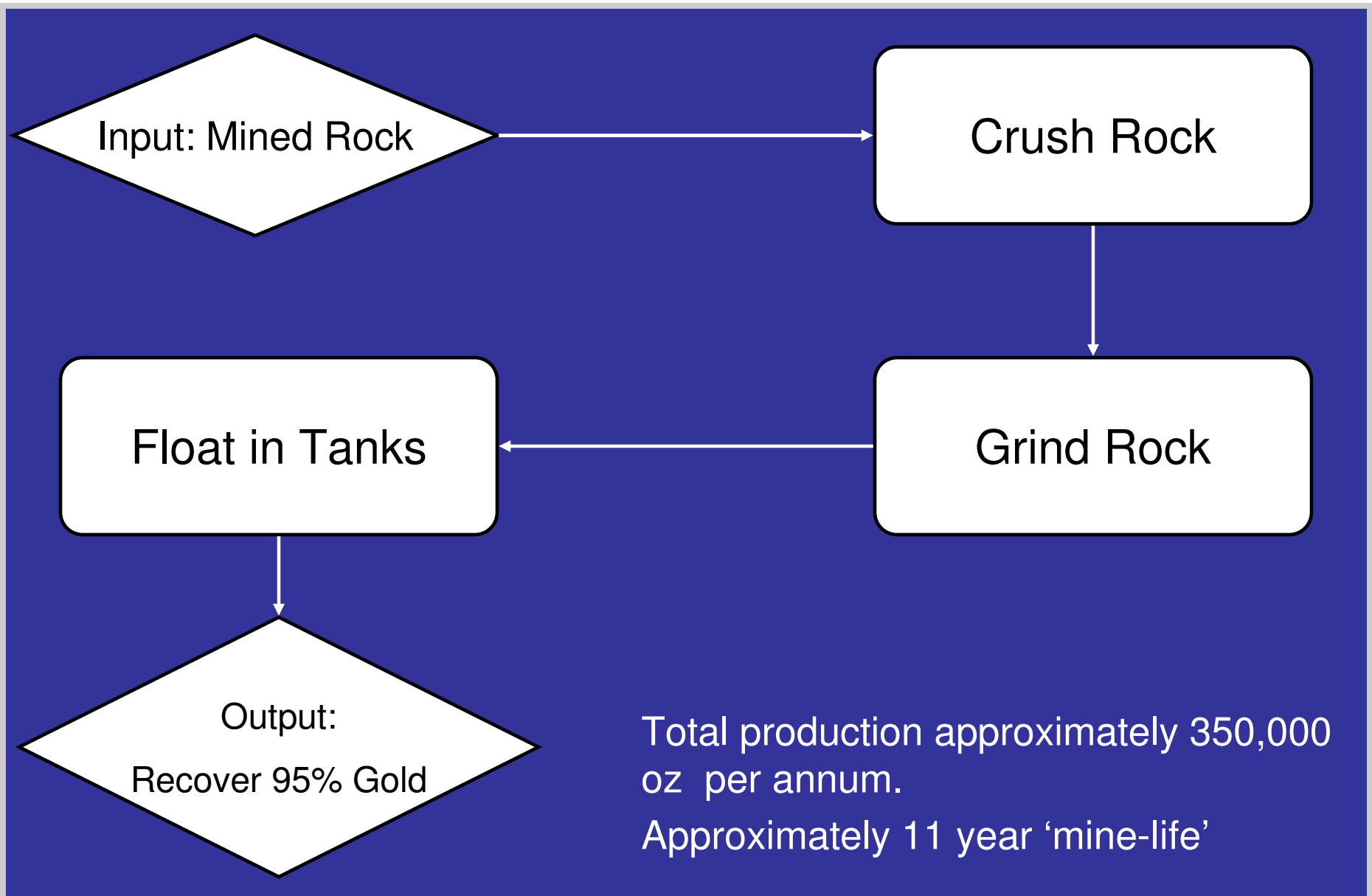


## Project employees:

- Approximately 1,500-2,000 during construction (including temporary contractor for construction)
- Approximately 900 during operations



**Current Merian Exploration Camp**





# Mine Transport Route



# Mine Closure

- Protect environment & public health & safety – ensure physical and geological stability of land
- Sustainable use of site after closure – continuous reclamation & rehabilitations of land back into forest
- Minimize negative effects after closure to environment and community - monitoring
- Overall positive impact to wildlife, animals and people - sustainable social and economic benefits



## Example Mine Closure - Indonesia





## Example Mine Closure - Indonesia



May 2008 – Five years later



# Example Mine Closure - Indonesia







## Example Reclamation of Mine - Indonesia







## Example Reclamation of Waste Rock - Indonesia



# Environmental and Social Impact Assessment

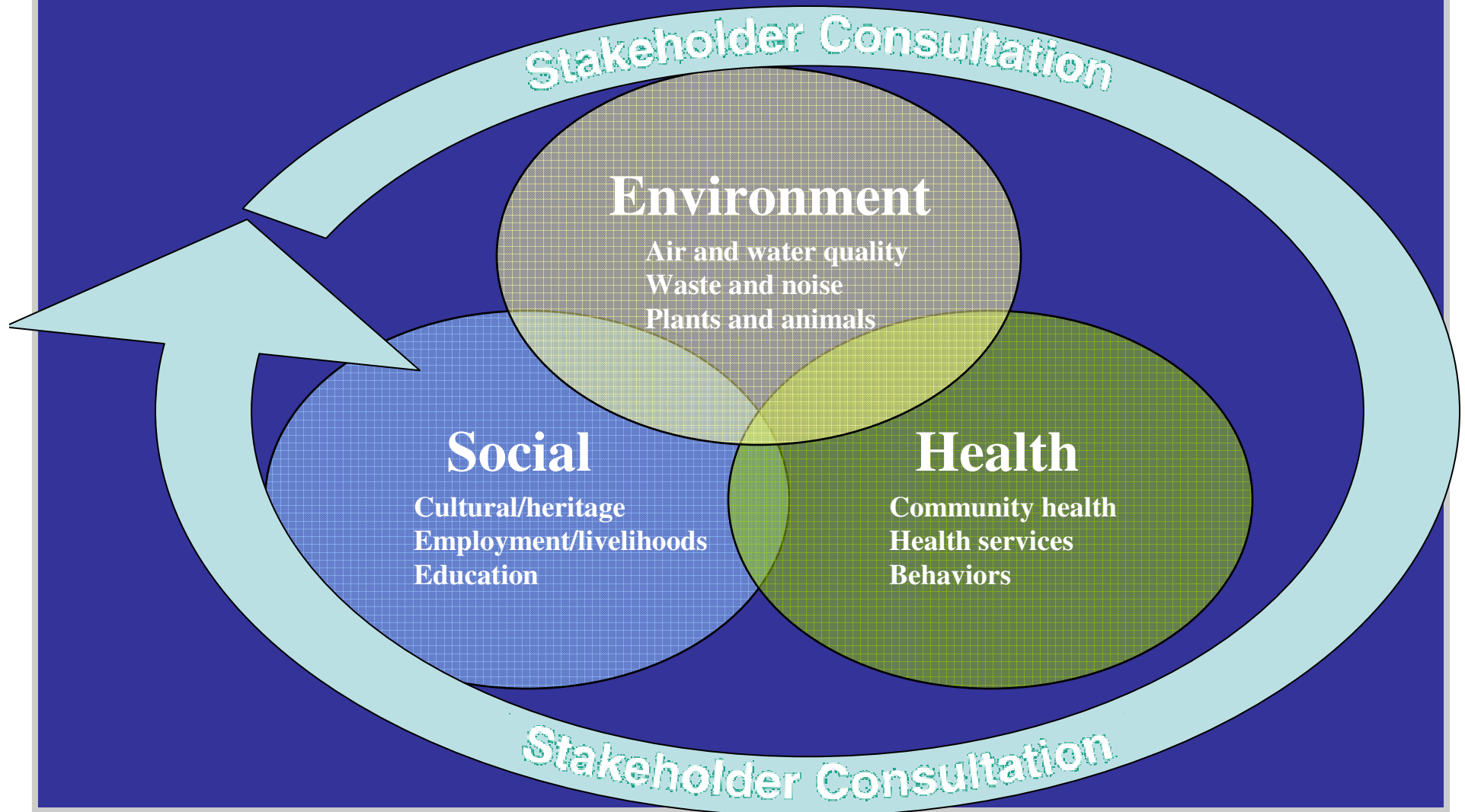
## *What is an ESIA?*

A process to determine the effects of a Project on people and the environment.

Promote positive impacts & reduce or avoid negative impacts



# Four Components of an ESIA



# *Who will do the ESIA?*

Environmental Resources Management (ERM) will conduct the ESIA.



- Independent, international consultant specialising in ESIA's
- ERM is an international environmental consulting firm with over 30 years of experience in impact assessment
- 40 countries, 3,000 employees - global expertise & local context
- A team of environmental, social, and health specialists with experience in mine Projects
- Approach to ESIA involves partnership with local specialists, including the specialists here today from ESS and others

# ERM's Role

- Surgold has contracted ERM to prepare the ESIA for the Proposed Merian Project
- ERM is separate from Surgold, they have commissioned ERM to:
  - Act as independent consultant to conduct the ESIA
  - Recommend measures to promote the positive and minimize the negative effects of the Project
  - Facilitate public involvement - encourage and enable interested people or organizations to participate in this process



# *What are the requirements for an ESIA?*

ERM will follow best practice guidelines for the ESIA:

- Surinamese National Institute of Environment and Development in Suriname (NIMOS) guidelines
- International Standards (International Finance Corporation Performance Standards)



This means the ESIA will:

- Involves public input throughout
- Documents current environmental and social conditions
- Predicts future conditions
- Recommends measures for maximizing positive and minimizing negative effects

# *What does an ESIA involve?*

- Scoping – Identify likely impacts and studies required
- Impact Assessment
  - undertake studies to understand existing conditions & predict potential changes.
  - Design ways to promote positive & reduce negative impacts
- Monitoring and Evaluation

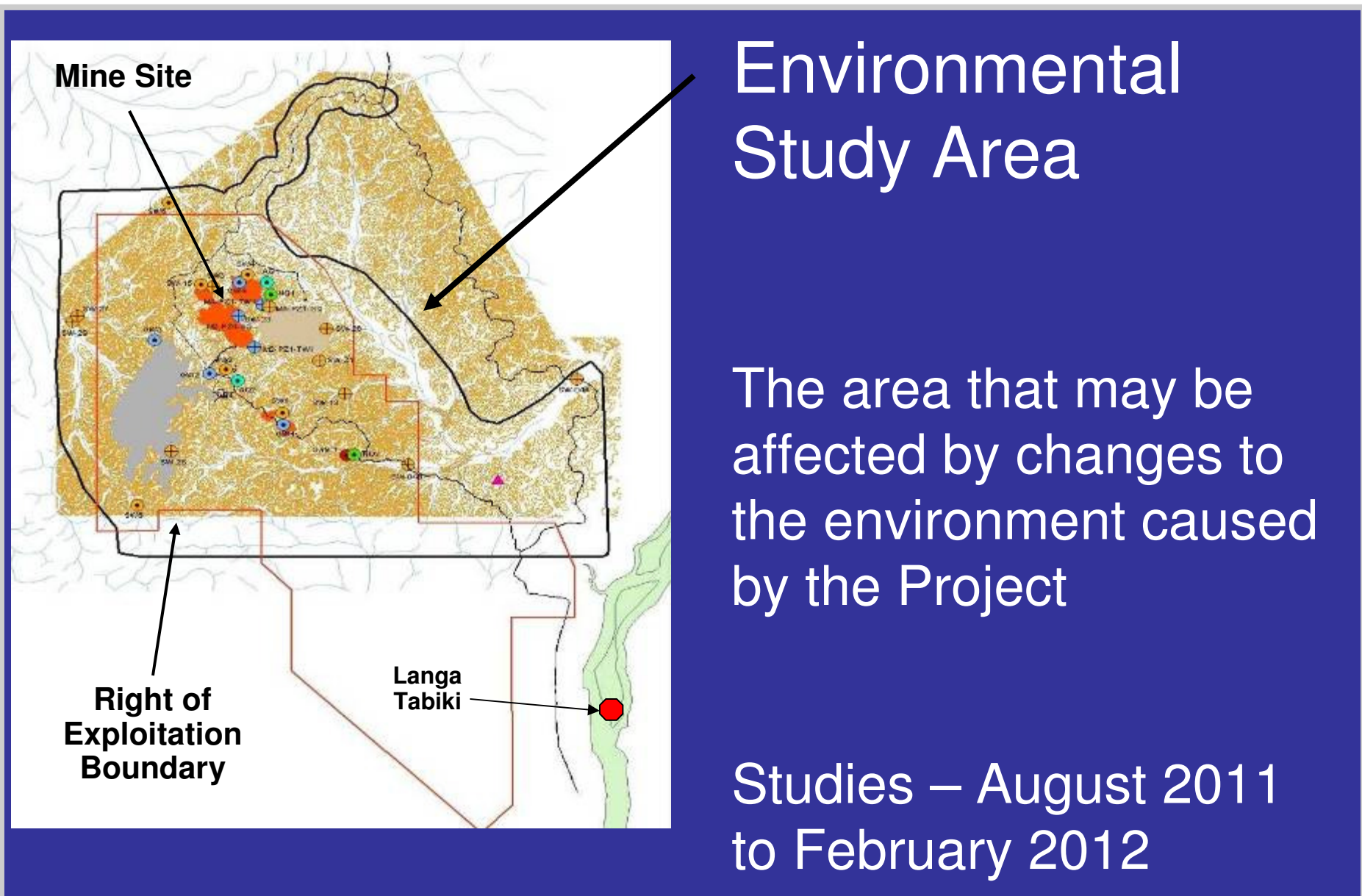


# Environmental Studies

- Groundwater Study
- Air Quality Studies
- Noise Study
- Plant Study
- Animal Study
- Soil Study
- Traffic Study
- Surface Water Quality Study







# Environmental Study Area

The area that may be affected by changes to the environment caused by the Project

Studies – August 2011 to February 2012

# Social and Health Studies

In the villages that could be affected

- Survey of households that may be impacted
- Interviews and groups discussions in impacted villages
- Health studies

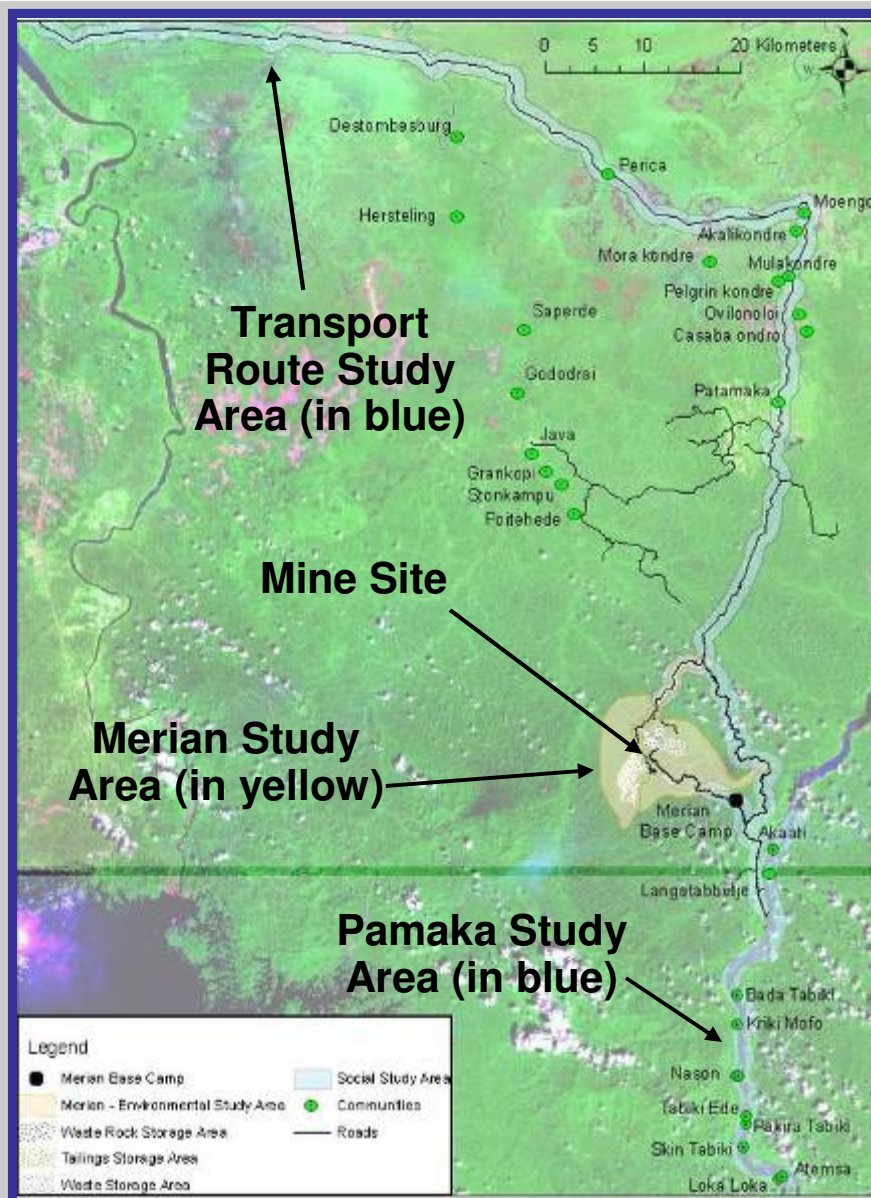


September 2011 onwards

# Social and Health Study Area

The area that may be affected by changes to the conditions in local villages:

- area surrounding mine site
- area along road
- Pamaka villages





# Public Consultation

- Public input is a critical component of the ESIA process
  - Solicit input from you throughout the ESIA process
  - Ongoing communication via mail, radio, email, and newspapers

## Consultation Principles:

Inclusive, culturally sensitive,  
transparent



# Review & Publication of ESIA Findings

- Distribute ESIA report to NIMOS, government & other interested groups
- Hold meetings to present impacts, the assessment & mitigation / management measures
- Receive public comments on the impacts & mitigation



# ESIA Terms of Reference

To Describe the purpose and structure of the ESIA

Available from:

- Surgold Office - Paramaribo (Suriname Straat)
- NIMOS office – Paramaribo
- Surgold Camp - Merian

# Overall ESIA Schedule

Date	ESIA Process/Activity
August, 2011	Public meeting
August 2011-February 2012	Baseline Studies
February –March, 2012	Impact Assessment Studies
March – April 2012	Prepare Draft ESIA report & hold public meeting to disclose findings
May 2010	Finalize ESIA report
June 2012	Deliver Final ESIA



# Next Steps

- Social & Cultural Heritage studies
- Environmental studies
- Will keep interested groups informed
- Disclosure meeting around April 2012

# Project Contacts and Information

## ERM

For ESIA questions or comments: Salomon Emanuels

Phone: (0) 8553324

Email: [salomonemanuels@yahoo.com](mailto:salomonemanuels@yahoo.com)  
/ [merian.esia@erm.com](mailto:merian.esia@erm.com)



## Surgold

For Project related questions or comments:

Project point of contact: Wendell Asadang

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Email: [wendel.asadang@newmont.com](mailto:wendel.asadang@newmont.com)

# Closing Remarks

- ESIA must be complete before exploitation right awarded by government
- ESIA is crucial to Project development
- You will have the opportunity to participate
- The ESIA results will be presented to you so you can comment.



**Thank you for your  
time!**

**Questions?**

