DEVELOPING POLICY AND GOVERNANCE STRATEGIES TO ADDRESS MERCURY AND SMALL-SCALE GOLD MINING

by

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Abstract

In over fifty countries, mercury is used to extract gold by artisanal and small-scale miners and poses significant threats to human and environmental health. While extensive research has focused on the negative effects of mercury, remarkably little attention has been devoted to institutional policies and governance strategies to reduce mercury use and associated risks. In many of the world's poorest regions, mercury amalgamation has become more prevalently used as worsening poverty has contributed to a growth in rudimentary gold extraction activities. This study examines how these challenges prompted United Nations agencies to launch a global pilot initiative addressing mercury in small-scale gold mining, focusing on the mandate of "assisting countries to transfer to cleaner technologies." Linking governments, NGOs, mining companies and other agencies, case studies from development campaigns in Africa, South America and Asia illustrate the complexities of environmental interventions in rural areas and the need for sensitive attention to government relations with mining communities. While mercury has been illegally used in most small-scale mining communities, this study demonstrates how strong stakeholder willingness to legalize mercury can help to more productively regulate and phase out mercury use and trade in order to eliminate major pollution point sources and health hazards. The study proposes developing *UN International Guidelines on Mercury in Small-Scale Gold Mining* to assist decision-makers at multiple governance levels, from village-level planners to national lawmakers and donors, in targeting technical priorities. Recognizing how narrow top-down policy models can be counterproductive, the analysis focuses on how interdisciplinary development planning teams have taken incremental and integrative approaches seeking to facilitate the reduction of pollution while supporting miners' livelihoods. A policy framework is proposed to assist institutions in cultivating educational, economic, and legal strategies for mining regulation and development while learning from diverse country experiences.

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CHAPTER 1: INTRODUCTION

1.1 Statement of the Problem

Artisanal and small-scale mining (ASM) is largely a poverty driven activity in developing countries. Defined in a multitude of ways, ASM is often recognized centrally as the use of rudimentary technologies for mineral extraction (Dreschler, 2003), and gold is the most commonly extracted mineral in ASM (ILO, 1999). As mercury amalgamation is an inexpensive, quick and simple way to extract gold particles, it is currently the method most commonly used in ASM (UNIDO, 2007a). As mercury is a potent neurotoxin that can cause extensive health hazards when released into the environment, a diversity of concerns have been raised about the use of mercury in ASM in recent years.

An estimated 100 million people depend on ASM for their livelihoods in over 55 countries spread throughout Africa, Asia and South America (Veiga and Baker, 2004). ASM produces 20-30% of the world's gold production, or approximately 500-800 tonnes per annum (Swain et al, 2007). The activity directly involves an estimated 13-15 million miners, including 4.5 million women and 1 million children, and is often performed by miners with little or no economic capital who operate in the informal economic sector, often illegally and with little organization (Hinton, 2006). As a consequence of poor technological practices, mercury amalgamation in ASM results in the discharge of at least 650 to 1000 tonnes of mercury per annum, equivalent to one-third (1/3) of all global anthropogenic (human-caused) mercury releases into the environment (Swain et al, 2007). This makes ASM the single largest intentional-use source of mercury pollution in the world. In addition to the serious occupational hazards associated with mercury use, ASM, has generated thousands of polluted sites with impacts extending far beyond localized ecological degradation, often presenting serious, long-term environmental health hazards to populations living near and downstream of mining regions (Hinton, 2006). It is estimated that as much as 300 tonnes of mercury per annum are volatilized directly to the atmosphere, while 700 tonnes are discharged in mine tailings into soil, rivers and lakes (Swain et al, 2007; Veiga and Baker, 2004, UNIDO, 2007a).

As a trans-boundary pollution threat, mercury has represented a clear prerogative for international agencies to promote environmental intervention to reduce risks. In addition to domestic pollution impacts, air emissions and tailings discharge contaminate both international waters and air. Yet, mercury in ASM is unlike other mercury-emissions sources; policymakers are thus confronted with a unique sector-specific challenge. Though large-scale gold mine operations have phased out mercury use by adopting alternative technologies, mercury demand in ASM continues to increase, mainly in remote rural areas of poorer countries. Based on evidence of mercury use in country-by-country and regional reporting, the United Nations has suggested that "mercury consumption and demand in ASM may be growing to a historically unprecedented level on the global scale" (UNIDO, 2007a, UNEP 2007). Researchers have thus been stressing the urgency to counter threats and encourage improved environmental practices. Academic literature has drawn extensive attention to the dangers of mercury over the past decade. Mercury has been called "a chemical time bomb" (Lacerda and Salomons, 1998), particularly as mercury hazards can bioaccumulate in ecosystems. Indeed, by far the dominant body of research on mercury in academic literature focuses on its environmental and human health dangers, often imparting the advice that mercury needs to be phased out through government intervention. Bridging the fields of environmental health and environmental economics, researchers such as Hylander (2001) have long emphasized the need for eliminating the trade of mercury and promoting mercury-free mining techniques. However, in a meaningful contrast of styles, some research has stressed how mercury is also "an agent of poverty," as Hilson and Pardie (2006) point out; they emphasize the view that mercury needs to be regulated rather than banned because poorer gold mining workers depend on it for survival—and because unregulated use may in many cases lead to even more environmental damage.

While different points of emphasis are made in different literatures in the social and natural sciences, there is often little disagreement that mercury has risen as a threat largely because of poverty. The increase in mining activity in various regions in Africa, Asia and South America is often compounded by escalating poverty due to factors such the failure of subsistence economies, conflict causing displacement of populations, and diseases and viruses such as HIV/AIDS (UNIDO, 2007a). While Hylander (2001) and Vieira (2006) have noted some possibilities for replacing mercury in ASM with 100%

mercury-free technologies, assessments by the United Nations Industrial Development Organization (UNIDO) have shown that technological replacements such as cyanide leaching and other 100% mercury-free techniques usually require far more resources than most ASM communities can presently summon. "Alternative technologies generally require a higher order of economic investment, organization, and technical expertise that miners have access to," (UNIDO, 2007a, p. 4) noted one report, clarifying the urgent need for mercury *reduction* strategy (rather than a complete elimination strategy) to promote technologies that efficiently conserve and re-use mercury in a close-circuit system – and wherever possible, phase mercury out completely.

Against the backdrop of these growing technological and social challenges, this thesis examines the role of international donor-funded interventions in the effort to reduce mercury pollution from ASM, focusing on the role of institutional policies and governance strategies. The awareness for the need for a global mercury pollution reduction strategy emerged from scientific revolutions of the 1950s and 1960s, after severe environmental health effects in Minamata alerted policymakers and researchers to the dangers of mercury (Selin and Selin, 2006). Yet, in the half century since then, political solutions for integrating this knowledge have proven elusive, especially in the context of ASM. At various United Nations conferences to address mercury since 2002, when mercury in ASM was first acknowledged by UNEP as warranting a global action strategy, there has been a growing effort to raise the awareness of how mercury pollution from ASM is linked to poverty. The 8th International Conference on Mercury as a Global Pollutant, held in Wisconsin in 2007, likewise focused on ASM concerns more than any of the previous conferences; keynote presenters from that conference published findings in *Ambio* detailing why it is that mercury use and pollution is increasing due to ASM, even as mercury use decreases in wealthier countries (Swain et. al., 2007). A complex issue involving numerous natural and social sciences, though, there remains much confusion about what values the international community should embrace with respect to development planning, and what specific actions governments might take through international collaborations. Narrow emphasis on conservation and technological ideologies of intervention has created limited – and ambivalent –spaces for discussion in public policy processes. Unresolved debates over the "informal" status of many artisanal and small-scale miners are contributing to diverse resource conflicts between the

industrial and ASM sectors; and often miners who are deemed "illegal" are automatically excluded from government services (Hilson, 2006). The limited capacities of public sector institutions, and the limited capacity of international institutions to negotiate effective global policies, have been challenges that further impinge upon the very hopes of assisting miners. As coherent government planning may be torn between jurisdictional pressures, often with disagreements between ministries of mining and ministries of the environment, the identification of who the "key policymakers" are is itself a task that remains largely ambiguous when it comes to the effort to reduce pollution in ASM.

In the absence of strong leadership and clear strategic guidance, most international programs have concentrated on environmental or health assessments, without addressing solutions at all or by simply perpetuating the assumption that mercury should be banned (Hilson, 2006). Many technical analyses fail to provide solutions for either metallic mercury exposure or methylmercury pollution (Veiga and Hinton, 2002; Hentschel, et. al., 2002), which have resulted in policy frameworks that may ultimately emphasize the wrong emission sources—for example, by emphasizing air emission controls without considering ways of dealing with tailings discharge, which is by far the most serious source of pollution and the one that UNIDO identifies as generally easier to reduce on a large scale (UNIDO, 2007a). How miners use mercury and what technologies could decrease losses to the environment are the subjects of numerous studies and projects. Yet few researchers have focused on linking these concerns to the political and institutional factors that influence environmental change in ASM communities. Clear and consistent strategic insights, accommodating the interlinked foci on economic, social, environmental and political dimensions, are needed to contribute to advancing global mercury abatement beyond its assessment phase, and into a spirit of action.

1.2 Significance and Contributions of the Work

This study offers various unique contributions to the study of mercury and ASM, with three primary contributions that have served as the underlying motivations throughout this work:

1) First, the study provides an analysis of how the United Nations' main mercury pollution abatement programs in the ASM sector were designed, implemented and experienced in the field. Various strategic considerations of the UN agencies involved are explored to understanding how development planning processes can adapt the initial donor mandates in efforts to meet the needs of local contexts and build proactive institutional capacities. The "Global Mercury Project," a six-country initiative of the United Nation Industrial Development Organization (UNIDO), with financial support from the United Nations Development Program (UNDP) and the Global Environment Facility (GEF), launched a "Policy and Governance Initiative on Mercury and Small-Scale Mining," which will be outlined and discussed. This initiative is the first globally coordinated effort to engage civil society and governmental stakeholders to address mercury policies in ASM, linking a myriad of agencies with the diverse concerns that have been raised by miners in rural areas and other stakeholders in Africa, Asia and Latin America as well as globally.

Through diverse learning processes, this study explores how the project moved from focusing narrowly on hazard diagnosis and technology regulation to broader issues as well, such as global mercury trade, mining legislation and micro-credit, for example. This study also proposes *International Guidelines on Mercury in Small-Scale Gold Mining* to build another specific key area of policy development that was not in the initial project mandate but emerged as a priority. The guidelines seek to assist decision-makers at multiple governance levels – from village-level planners to national lawmakers to donors, to assist in targeting technical priorities. Among other motivations, this specific contribution seeks to help reduce the problem of "re-inventing the wheel" while putting policymakers in touch with practical challenges that miners are facing. These proposed guidelines are presently (in 2008) in a process of discussion (in draft form) among U.N. agencies and posted on the UNEP website; they highlight different "minimum threshold" technological standards that are deemed to be achievable in most mining communities, based on stakeholder guidance throughout the consultations undertaken.

2) While the first contribution, above, is concerned with understanding the role of global institutions, the second primary contribution of the study is its examination of empirical insights from different countries and geographic regions in order to encourage an

appreciation of how different societies have gone about approaching concerns about mercury and gold mining in multiple ways. There is no "one-size-fits-all" model to pollution abatement, and different regions demonstrate starkly different mercury abatement strategies through the course of the research. For example, as it will be discussed later, new policies to legalize miners emerged as a result of the United Nations' intervention processes in Indonesia. In Zimbabwe, developing new measures to address cleaner and equitable technological standards for millers (the "bosses" and landlords of miners) and miners became the project's major policy focus. Different community dynamics illustrate how international agencies are drawn to engage local stakeholders in a multiplicity of ways. Some of community-specific findings of this study have already been published (e.g. Hinton and Veiga, 2003; Spiegel and Veiga, 2006; Spiegel et al, 2006) and other local studies are referred to throughout the study, building on the work of in-country experts. While continuous in-depth focus on regional mining community dynamics is clearly needed, the present study focuses on global knowledge exchange and seeks to contribute to North/South and South/South knowledge-exchange by sharing analysis of different regional experiences.

Recognizing the complex relation – and inseparability – of the very concepts of "local knowledge" and "global knowledge," the study seeks to cultivate a way of collecting information that recognizes how development practitioners might learn from different cross-geographical experiences. Theorists of environmental policymaking have widely noted why it is important to appreciate how power and knowledge interrelate in crafting recommendations and theoretical insights; "knowledge production," writes Nybren, "is seen as a process of social negotiation involving multiple actors and complex power relations" (Nybren 1999). This study proceeds with the view that an appreciation of regional and situational differences is necessary to be able to live in a world where local cultures and global relationships can interact in productive and sustainable ways. Examining knowledge production reveals how international collaboration takes different forms according to context; only by appreciating these differences and attempting to understand their motivations can global policymakers be appropriately informed.

3) As its third primary contribution, the dissertation contributes to a particular way of linking natural sciences and social sciences, by demonstrating how the livelihood

concerns of miners need to be a part of the "mercury debate" – and also, perhaps much more importantly, how the "mercury debate" needs to be part of the discussion on how to improve livelihoods. The analysis investigates how institutions went about approaching the mercury-specific concern as well as broader livelihood concerns. The international guidelines – and other regulatory developments – are meant to be understood within a larger framework of understanding how environmental, economic and political inequalities can be engaged. The study proposes that micro-finance institutions be more actively involved in pollution abatement projects in ASM communities, describing some of the experiences of engaging such institutions. Also, governments can take measures to improve the legal and economic rights of vulnerable rural ASM workers; and interdisciplinary research can help to show the need for intertwining economic efficiency issues with environmental management concerns with various other political objectives of addressing concerns about equity in economically vulnerable communities.

This thesis is meant to be a practical one. Focusing on descriptive analysis, it also draws the reader to wider literatures that may assist in further interlinking the multiple challenges of development work and how different conceptual understandings come to bear on policymaking processes. Notably, this wider literature involves published scholarly writings by prominent experts in the field of ASM issues, such as Veiga, Hinton, Hilson and others, as well as local experts recruited by the UN to provide greater contextual insights, and also broader theoretical work in development studies, environmental education, and political ecology, among other fields. Through this diverse study, it is contended that interdisciplinary approaches highlight why regulating mercury, rather than banning mercury outright, can be the best approach in various contexts, and that such regulation can allow a diverse array of useful policy options for encouraging healthier environments as well as improved livelihoods and institutional relationships.

These three contributions are not fixed in stone and the analysis is not static; rather, the discussion remains an open-ended field of study. The initiatives that are examined in this study remain ongoing in many cases or, in some cases, only recently completed. What is most significant, perhaps, is that the actions and strategies profiled in this study present a clear departure from the years of doing nothing (or doing far too little) at the global and national levels of development planning in order to address the serious

threats of mercury in gold mining. For policymakers dealing with environmental contaminants, Minamata, Japan, where thousands of people were poisoned after eating toxic fish, was one of several crises in the 1950s and 1960s that proved there was a connection between low concentrations of chemicals in aquatic systems and biological accumulation up the food chain (Benjamin and Honeyman, 1992). However, the social science of communicating the risks of mercury contamination, and integrating this knowledge into public policy, industrial practice, and consumer awareness is significantly less mature than the mercury science paradigm. Until only recently, the mercury policy community had focused in a limited way on cap emissions from coal-fired power plants, and intentional uses wherever mercury is still part of industrial processes. Yet when the fact emerged in the past few years that ASM is the biggest mercury consumer, and second biggest polluter of metallic mercury, this data threw the emerging social science of mercury pollution abatement into confusion.

Some researchers have, arguably, still fallen into the trap of discussing "global mercury pollution governance" while conspicuously overlooking the ASM issue. For example, Selin and Selin (2006) recently published an article with the title, "Global Politics of Mercury Pollution: The Need for Multi-Scale Governance" – a title that suggests a global scope but one that in fact entirely overlooked the world's fastest growing source of mercury pollution – ASM. Why didn't they address ASM? In defense of Selin and Selin, who provide an excellent analysis of the other areas of governance (in numerous other mercury-emission sectors), ASM is not easily integrated in other mercury discussions globally because it is unlike any other mercury policy issue. Mercury is so deeply linked to the economics of gold mining, and gold mining to the economics of poverty and the politics of currency trading, that there is minimal awareness of how policies may come to influence ASM and mercury. This study would emphasize at the beginning that any analysis of "global mercury politics" should consider ASM carefully. Among other reasons, as Veiga et al (2006) illustrate in their seminal study of global mercury trade routes, the mercury that is used in European and North American countries often ends up going to poorer nations where it is illegally diverted towards ASM. As a result, environmentally conscientious policies such as "recycling" in wealthier nations may in fact, the authors note, often increase the mercury supply in developing countries and thus give rise to an urgent need for new policy strategies in poorer regions where ASM

occurs. In a globalized economy, in a global ecosystem, and in a globalized policymaking atmosphere, there can be little dispute that mercury in ASM is a decidedly "global issue" for various reasons.

It is also important to emphasize from the outset that developing mercury policy for the ASM sector involves many interlinked environmental, engineering, public health, socio-economic development and political priorities; as such, one's perception about what is required to ameliorate environmental health practices in mining communities is often defined by disciplinary expertise. An engineer may tend to view the urgent needs of global development planning in terms of technology, a biologist as ecological preservation, an economist as a macro-developmental issue, a geographer as land-use planning or institutional relationships, and so on. Developing strategies that touch all these areas requires a unification of streams of environmental, technological, and socio-economic policy not generally treated in an integrative way. A descriptive approach to paradigm development, uniting various streams of natural and social science, is thus needed to reverse the growing trend of mercury pollution from ASM in poor countries. In the ecosystem services sector and broader environmental health literature, many have researchers have proposed how interdisciplinary approaches are needed. Various Canadian studies (e.g. Lebel, 2003; Lebel and Forget, 2001) were instrumental in helping to shape environmental research on interdisciplinary development dynamics, focusing on principles of equity, gender and participation, which have subsequently been key pillars of Canada's foreign development policy through its International Development Research Centre (IDRC). The need for greater multidisciplinarity and interdisciplinarity in delivering intervention to ASM areas was identified for UN agencies too, more than a decade ago by Veiga (1997b), who writes: "One of the greatest difficulties in reducing emissions and recognizing dangerous sites is the scarcity of people of who can transfer knowledge about the issues." Veiga notes that a multi-disciplinary approach is needed for field observation as a preliminary step for evaluation of the pollution problems and also as a means for moving from hazard-focused discussion to practical solutions.

Building on more recent interdisciplinary analyses of mercury in ASM that draw a focus on knowledge translation through North/South collaboration, (e.g. Spiegel and Veiga, 2005), Tschakert and Singha (2007) have weaved in insights from political ecology

literature to understand the danger of stigmatization through hazard discourse. They suggest that miners get "contaminated identities" as a result of their vilification in popular media discussions of environmental threats. Criminalization is linked with environmental problems, Tschakert and Singha suggest, in ways that require a far more nuanced recognition of political risks by all stakeholders – whether they be toxicologists who test miners' blood, bankers who refuse to give loans, or otherwise.

Various writers on the ecosystem approach to health have noted that descriptive interdisciplinary writing, when appreciating variant paradigmatic approaches, is a first critical step of pragmatic theoretical development (Lebel, 2003). Interdisciplinarity studies necessarily lead to multiple approaches and multiple types of questions – educational, political, and otherwise. Descriptive analysis involves precise written and statistical observation, documentation, and measurement of the subject, which may include observation about people, organizations, and technologies, as well as processes of human relations. Without insightful descriptions to subsequently build upon, researchers can find themselves optimizing misleading concepts. A trade specialist might presume, perhaps, that mercury trade laws in a given country are bound to be the most important strategy to reduce toxic flows – a point of emphasis that is questioned later in this research. A toxicologist might presume that increasing "mercury awareness" is the most important step; this presupposition is also questioned later on. Only by questioning narrow conclusions through a descriptive, empirically-guided form of analysis can researchers begin to see how they may overlook serious risks of how the machinery of development works and create problems inadvertently. While much contemporary academic literature has stopped using the descriptive voice altogether as a means of documenting experience and asking questions, particularly in more static fields where normative theory is firmly rooted, the danger arises that entrenched theoretical frameworks will trump realities; data can be made to fit into a pre-fixed model, but the model itself may never be sufficiently adapted to suit the contexts.

In an emerging specialty like mercury pollution from ASM, an interdisciplinary approach to descriptive data collection remains a crucial form of theory development. The key insight perhaps is that descriptive research contributes to theory in specific and broad senses; without description there can be no theory. Moreover, while theoretical biases

will always be present in any given empirical study, it is only the studies that seek to probe questioningly into multiple theoretical frameworks and contexts that can provide a truly 'integrative' and adaptive kind of analysis in favor of interdisciplinary learning. This study proceeds with the view – as argued vigorously by Hilson (2006) – that people involved in the development projects themselves need to be far more frequently and far more carefully dedicated to sharing results with the public. Only by *sharing* information from *experience* – and discussing the *multiple* implications – can society begin to address the vast environmental, social and economic challenges that stand before us.

1.3 Methods

The research synthesized here is a result of extensive fieldwork that took place between 2005 and 2007, primarily as assignments for the United Nations Industrial Development Organization (UNIDO) while serving as a policy advisor. The fieldwork centrally involved research and stakeholder engagement in ASM communities in Indonesia, Tanzania and Zimbabwe, with multiple official UN missions conducted in each of these countries to gather and discuss information on pertinent policy issues. Shorter trips in mining communities in Brazil, Madagascar and Mozambique were also taken (the former as part of conference trips and the later as a pilot project). The research also involved close interaction with research affiliates in Sudan and Laos over this period, with whom the author collaborated in processes of developing policy and governance recommendations and campaigns. While the focus has been on regional results in mining communities, a variety of global-level planning discussions has been key in sharpening this focus, through intergovernmental conferences, workshops, and negotiations; consultations with major and minor multinational gold mining companies; and UN meetings in New York, Madison (Wisconsin), Vienna, and other locations.

Insofar as it included fieldwork in a total of 12 countries and provided intimate access to the inner-workings of many policy institutions, this experience provided a variety of analytical windows into diverse local experiences as well as "global window" into the transnational challenges of addressing mercury and gold mining. Research activities in the field occurred in the form of semi-structured, structured and unstructured meetings and workshops, interviews, and diverse professional experiences of collaboration. The

study involved personal interaction with hundreds of miners and various mining federations and associations. The intergovernmental agencies most closely linked with this research, and which supported much of this research, are the Global Environment Facility (GEF), the United Nations Development Program (UNDP) and the United Nations Industrial Development Organization (UNIDO). They were the leading agencies in implementing and executing the Global Mercury Project – the project that is centrally examined in this study. The author also worked closely with officers in the United Nations Environment Program (UNEP) and the World Bank to learn from their endeavors and help create productive collaborations where possible. The research also involved interactions with the private sector, such as the AngloGold Ashanti in Tanzania and other mining companies and microfinance banks. Primarily, the research entailed learning from – and also advising – governments participating in the GMP initiative[1], as well with those in the United States, Canada and elsewhere, through iterative processes of interaction. The author additionally collaborated with the non-governmental sector, including agencies such as the Natural Resources Defense Council, Mercury Policy Project, Zero Mercury Campaign and Association for Responsible Mining.

Throughout this dissertation, the empirical and analytical observations collected in the field are matched with and enhanced by scholarly and public policy literature available on the subject. However, the central purpose of this thesis is not to rely on the authority of academic theorists; nor is it to privilege academic theorizing above practical or indigenous knowledge that might be considered "non-academic" as necessarily the ultimate answer to the key problems being confronted. The goal is, rather, to explore the real-life empirical dynamics of action through collaboration. In many cases, miners have the most crucial knowledge that can help reduce pollution, if only their voices could be heard in the right policy venues. An important role of research is to help stakeholders to understand what works and doesn't work in terms of international intervention in the ASM and mercury context. This thesis, notably, is not primarily concerned with drawing final judgments about "what works and what doesn't work"; in many cases, only time will be able to tell how effective certain strategies were, and independent adjudications in a

[1] The GMP was officially designed with the following countries as the participants: Brazil, Indonesia, Laos, Tanzania, Sudan and Zimbabwe. Other countries such as Mozambique also came to be involved through pilot projects and other collaborations.

year or two's time will help to facilitate that judgment. Its primary goal, rather, is to provide an exposition and exploration of goal-making and development processes—a probing into the processes of developing policy and governance strategies at multiple geographical levels – from village-level leaders to national lawmakers and beyond. In exposing different contexts, texts were integrated from a variety of disciplines, historical, economic, political theory, etc, to shed light on how certain social processes could work and what lessons in the short term can be learned.

The "data set" on which the research is based is a broad spectrum of experiences working in the capacity of a development intervention process. As such, there are inevitably moments when this dissertation risks hypothetical interpretations, often drawing on the information collected trustingly from professional sources. This approach does, necessarily, bring a subjective perspective that makes much of what is said conjectural, and less easily replicable than the results of research conducted along the firmer traditions of an established, mono-disciplinary scientific paradigm. This subjectivity of interdisciplinary exploration, however, is ultimately shared by nearly all data; all data "whether presented in the form of large data sample analysis on one extreme, or an ethnographic description of behavior on the other — are subjective" (Carlile and Christensen, 2005). In many ways, the methodological approach might be viewed here as an *ethnography of global project development.* The idea of an "ethnography of global connection" was developed in Anna Tsing's book Friction (Tsing, 2005), which examined socio-environmental debates as transnational processes of friction. This approach to ethnography has provided much inspiration for this study, seeking to understand not merely the purported realities of one geographical place but rather, the multiple places of connection that make up social and socio-environmental relationships. Recently, many have written of a 'clash' of civilizations, ideas, knowledges, and cultural formations – often providing criticisms of development work. Tsing's key innovation is to examine collaboration as more than merely conflicting interests, thus keeping a practical and hopeful approach in play while appreciating diversity.

Developing public policy for mercury in ASM is a combination of understanding human needs, action, evaluation, and hopefully revision of the actions pursued based on the results of the evaluation. However, it is often not the case that the wisdom of one policy

can be transferred to another area. Most situations are simply too unique and too dependent on unpredictable human or natural variables, to warrant governance by extrapolation. As Homer-Dixon (1999) articulates, "The policy tools available in one case will not be available in another, for wholly idiosyncratic reasons." To some extent, each case study, experience, or interpretation offered can be considered a data point that contributes to the general analysis. The accuracy and details of each datum could also conceivably be challenged and re-interpreted, for instance, by retracing the steps of a particular field experience. Too much emphasis on skeptical or nihilistic interpretations of 'true' experience, however, risks preventing the theory of how to reduce ASM mercury pollution from moving beyond its descriptive moment and being locked into a paralysis over the undeniable reality that communities and heterogeneous and intervention contexts are subjectively interpreted. Given that as of 2002 there were at least 160,000 artisanal mine sites around the world (Hinton, 2002), designing intervention strategies anew one location at a time is unlikely to be a realistic approach from which to change the nature of global planning as a whole. The interpretations offered in this dissertation will certainly be enhanced as further region-specific and disciplinary-specific policy analysis is pursued. In setting a path for such work, this dissertation examines the UN's development of a global framework that will hopefully contribute to the genesis of a social science that is emerging in response to profound social and ecological challenges.

1.3.1 An Integrated Use of Qualitative Research Techniques

Qualitative research captures the essence of attitudes in the social world. Distinct from quantitative methodologies, which are effective for identifying mathematical measures for comparison, qualitative research focuses on providing insights about phenomena in a social context. Methodologies are numerous and varied; they evolve in design and present multiple realities. Qualitative research considers the role of researcher as an instrument of data collection and focuses on the perspective of participants and inductive data analysis (Creswell, 1998). Mason (2002, p. 4) describes this methodology as "grounded in a philosophical position which is broadly 'interpretivist' in the sense that it is concerned with how the social world is interpreted, understood, experienced or produced." Qualitative research approaches the collection of data with sensitivity to the social context in which they are produced. As a qualitative research methodology,

phenomenology allows for the exploration of social meaning through the lens of individual experience. It prioritizes the researcher-participant relationship and focuses primarily on the lived experience of the individual within broader social interactions.

Phenomenological research and the 'lived experience' are best understood in terms of vicarious experiencing of phenomena with intent to describe. Individual experiences are given centrality and the objective is "to determine what an experience means for the persons who have had the experience and are able to provide a comprehensive description of it. From individual descriptions, general or universal meanings are derived (Moustakas 1994 in Creswell, 1998, p. 54)". Collection of verbal data in phenomenological research can result from "straightforward description, interview or a combination of the two" (Giorgi, 1997, p. 10). As Kvale describes, "the purpose of a qualitative interview is obtaining qualitative descriptions of the life world of the subject with respect to the interpretation of their meaning" (Kvale, 1996, p. 124). Carpenter provides a strong rationale for the use of phenomenological methodology in this study: "Phenomenology is well-suited to holistic questions of meaning that spring from experience...In particular, phenomena that are not well understood and that are central to the lived experience of human beings are appropriate for phenomenological research" (Carpenter, 1995, in Lavasseur, 2003, p. 409). A close affiliate of phenomenological research is notably what is now popularly called "action research," a form of research through collaboration with others who my share common goals. Schmuck's book "Practical Action Research for Change" (2006) demonstrates how action research can be an education strategy, based on "reflective professional practice," (p. 47), to see how workers relate in ways that can shape new understandings of past, present and future.

The various scholars above have all noted that qualitative research, whether embedded in professional practice or not, needs to be sensitive in understanding how methods inform results. Vast bodies of literature on professional development expertise also argue that international development aid agencies need to be far more attuned to this interplay (e.g. Briggs, 2005). For any researcher in the field of ASM issues, a key methodological insight in engaging ASM communities is how different research tools may lead to different understandings of the "problems." This study used a variety of techniques of semi-structured and unstructured interview, group stakeholder workshops,

and participatory observations. In engagement with groups, oftentimes a group of miners would identify the problems that the national government is responsible for as detrimental to their ability to improve their technologies. However, when the owner of the land or mining title leaves the group at the end, the miners may explain how the injustices also lie permeate the relation they have with the owner or landlord. This occurred in numerous conversations in Tanzania, Zimbabwe and Indonesia, demonstrating not merely differences between communities but differences in how contexts of group workshops necessarily had a bearing on the results obtained.

In some cases in Indonesia, stakeholders stressed how previous international development projects have failed or even contributed to serious problems. For instance, some stakeholders emphasized that a USAID program promoted cyanide as a replacement for mercury without actually eliminating mercury first, thus causing new environmental hazards as a result (Sulaiman et al, 2006). Some interviewees were less inclined to share their frustrations with donor aid if questions were not sufficiently open-ended. Building trustful relationships in data collection, and triangulating information among sources, is clearly required. This key methodological insight is not necessarily a statement of where the greatest problems lie; rather, it is an acknowledgement that different approaches necessarily lead to a divergent view of "where the main problems lie." Some might argue that there is thus a need for standardizing the ways that research and development are conducted; on the contrary, this study attempts to make the most out of diversity, and to appreciate and learn from the diverse insights of different planners involved in the GMP. In appreciating this, development agencies and experts can, notably, learn from asking critical questions about how they themselves operate; adopting an introspective approach also enables the reader to appreciate how professional approaches themselves are often prone to mistakes and give way to new types of comparative and constructive learning.

1.4 Structure of Chapters

The thesis comprises five chapters, each containing distinct but interlinked goals. This first chapter has laid out some of the key problems facing the global development

community. The second chapter, entitled "Identifying Global Priorities and Building Capacities", provides an analysis of how the United Nations' Global Mercury Project encountered diverse challenges in its planning phases and how multiple goals were identified and pursued to address mercury and ASM. Different insights from different paradigms of research– from "ecosystem approaches" to "political ecology" approaches – can be critically useful in helping development planners to devise appropriately sensitized and informed methods of intervention. The chapter is both historical and analytical, demonstrating how project participants encountered different imperatives and concerns in relation to policy design and implementation. The third chapter presents the actual text of the UN's Strategic Plan on Policy and Governance, which was written as part of this study as a basis upon which to engage stakeholders—engaging global, national and local institutions to support cleaner technologies in mining communities. This framework was initially designed following a literature review, international consultation processes, and fieldwork undertaken by the author in October to December of 2005, in Indonesia, Tanzania and Zimbabwe. The framework has been revised multiple times through stakeholder involvement in the UN efforts and is intended to be a flexible one that can adapt as stakeholders voice concerns. The fourth chapter provides an analysis of the initiatives and results of the interventions between 2006 and 2007, identifying how "removing barriers to the adoption of cleaner technologies" has been empirically understood in the field and translated into various action strategies that seek to improve policy and governance to address mercury and ASM. Each policy initiative of GMP is assessed in terms of its goals and in terms of the dilemmas of interpreting the "success indicators," raising critical questions as well as providing pragmatic analyses of planning. The final chapter concludes, emphasizing how lessons learned demonstrate clear rationales for further research and development to address the challenges. It emphasizes the need for international support to institutions that can work productively with mining communities.

CHAPTER 2: IDENTIFYING GLOBAL PRIORITIES AND BUILDING CAPACITIES

2.1 Small-Scale Mining and Mercury as Global Issues

"Artisanal or small scale mining is largely a poverty driven activity, usually practiced in the poorest and most remote rural areas of a country by a largely itinerant, poorly educated populace with little other employment alternatives"
(Drechsler, 2001:4).

"Small-scale mining means different things to different people. To some it is dirty, dangerous, disruptive, and should be discouraged. To others it is profitable, productive or simply the only way out of poverty."
(International Labour Organisation, 1999)

ASM provides a critical source of income for growing rural populations spread over 55 countries worldwide. Globally, donor institutions have increasingly noted that 80 to 100 million people are directly and indirectly dependent on ASM for their livelihoods (Veiga and Baker, 2004). The failure of Economic Structural Adjustment Programs (ESAPs), droughts and innumerable other factors have critically limited livelihood options in Africa, South America and Asia and have contributed to the growth in ASM activities in recent years (Hilson and Potter, 2005). Such mining usually involves rudimentary, inefficient and environmentally unsound practices, including extensive mercury pollution. This sector is the world's largest source of mercury pollution from intentional uses, the second largest emission source after coal-fired power plants (Swain et al, 2007).

Gold has risen in value at rapid rates; its international price was US$ 260/oz in March 2001, and over US$ 1000/oz in March 2008. ASM has increased in many countries, and significant gold rushes are now predicted in numerous East African nations in the coming decade (UNECA, 2005). The United Nations estimates that that poor amalgamation practices in rudimentary gold mining may cause as much as 1000 tonnes of mercury to be emitted into the environment per year, contaminating the air, soil, rivers and lakes. In

its 2007 report for the United Nations Environment Program (UNEP) Global Ministerial Forum held in Nairobi, UNIDO analyses noted that "mercury use from ASM may be growing to a historically unprecedented level on the global scale" (UNIDO, 2007a, p. 3). Global recognition of the artisanal and small-scale mining sector has increased in recent years, and increased calls from NGOs, governments and other stakeholders in civil society for actions to control and phase out mercury trade and use.

Strict conservationist advocacies have placed ASM in a complex environmental conundrum. Many conservationist advocacies have emphasized the need to cut off mercury trade from mercury exporting countries (Hylander and Meili, 2005). Yet, a nuanced approach is needed in attempting to reconcile such a view with the recognition that mercury is depended upon by miners who often have no low-cost alternative for extracting gold. In 2007, the European Union – the largest source of mercury imports into the developing world - formally agreed to implement a ban on mercury exports, providing new hopes that legal mercury trade will be phased out. While the spirit of regulation has permeated mercury discussions on the global scene, in many countries, however, the nature of criminalizing mercury use and mercury trade both carry sensitivities that warrant discussion. While many agencies have called for "zero mercury use" (e.g. Zero Mercury Campaign, a consortium of NGOs) in the past, various scholars have noted that mercury education and technology transfer is rendered difficult or impossible because mercury use is banned. Improving environmental practice requires education, which in turn requires political and institutional support to millions of miners who are, paradoxically, marginalized due to the environmental risks they present.

In China, an estimated half a million ostracized miners lack access to state support services, and government officials have been weary to deal with miners due to the illegality of their operations, with mercury representing a potent source of anxiety about the activity (Gunson and Veiga, 2004). In Ghana also, miners use more mercury as a clear consequence of exclusion from education programs (Hilson, 2006). In both cases, policies exist to legalize mercury in theory, yet government officials have been noted to be ambivalent about issuing licenses for mercury use by miners. Environmental educators not being permitted to work with miners who use mercury illegally has often been cited as a problem by the authors. If these cases have proven controversial, an

even more controversial case arguably surfaced in 2007 and 2008 when Mongolia, which hosted the World Bank's 2007 conference for its CASM (Communities and Artisanal and Small-Scale Mining) program, decided that mercury should be banned.[2] This occurred despite the widespread advocacy by small-scale mining experts present at the conference, who believed that this would further force mercury into an underground and un-regulated context. Some interviewees even suggested that this move was designed as a demonstration that the Mongolian Government was providing a favorable investment climate for foreign mining companies (large companies don't use mercury while criminalizing mercury effectively removes the legitimacy of most artisanal gold miners, who often compete for the same land as large companies). However, mercury hazards can be addressed through policy in various ways besides a ban, as this thesis examines.

Jennings (1999) has provided extensive analysis on global strategies to address gold mining challenges and associated technological dimensions associated with mercury, emphasizing that most attention has been placed on "finding technical solutions to mining and processing problems, with scant heed being paid to the underlying economic, labour and social issues" (Jennings, 1999, p. 5). This approach "has proved inappropriate environmentally," he argues, and widespread agreement seems to be present governments and donor bodies have repeatedly designed and implemented costly technologies and educational programs that have yielded merely marginal improvements. "In fact, it appears that failure to analyze community dynamics and embrace miners' concerns in decision-making processes has perpetuated the mercury pollution problem," argues Hilson (2006, p. 1), using insights from Ghana to suggest that narrow mercury-centric thinking has generally tended to neglect the actual dimensions of community change that affect mercury. Severe laws and inadequate assistance policies, he notes, have forced Ghanas miners, known as galamsey, into illegal spaces that cannot be regulated and that donor projects and environmental educators are not allowed to visit.

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[2] See Mercury Use Banned in Mineral Exploration, 2008-04-09 http://www.montsame.mn/index.php?option=com_news&task=news_detail&tab=200804&ne=898

While excessive controls on mercury use may discourage proactive measures for regulation by fuelling illicit use, steps to control the availability of mercury in mining communities may also have unforeseen effects that could render mercury more expensive and leave miners with few gold extraction alternatives. Global leaders have now widely discussed benefits of restrictive mercury policies, but the risks of such restrictions remain largely unrecognized - and yet formidable. In the absence of additional assistance to swiftly adopt alternative methods, loss of legal access to EU exports could further force impoverished miners to turn to underground channels for the mercury they need, causing greater dependence on illicit gold dealers who provide mercury for free in exchange for exclusive purchase of gold at very low prices—as already documented, for instance, in Mozambique, Ghana and Indonesia (Spiegel et al, 2006; Hilson, 2006; Sulaiman et al, 2007). This common problem hinders the implementation of vital pollution control measures and also deepens social inequities, causing miners to be increasingly trapped in a vicious cycle of technological stagnancy and poverty. As Siegel (2007, p. 42) argues, "Cutting-off miners from mercury can thus be, arguably, a regressive tax that forces the group at the lowest economic rung to take a pay-cut without necessarily reducing mercury pollution." In fact, middlemen often benefit precisely from the inefficiencies of mercury-intensive technologies and, in anticipation of the 2011 mercury ban, field evidence suggests that illicit dealers have already started to increase global stockpiling, a likelihood that may allow hazardous environmental practices to flourish in the near future (Handelsman, 2007).

Debates over how to address mercury often oscillate between emphasizing the "chemical time bomb" and the "agent of poverty" as discussed in the opening chapter. While appreciating these various perspectives, a central conclusion can be reached: after stakeholder discussions with the countries involved in the GMP, it is clear that most experienced experts in the field believe that it is not only a matter of being *equitable* – but also a matter of promoting *effective* environmental policy - that global mercury reduction strategies need to be integrated in a broader environmental strategy that addresses the fundamental needs of miners who live in conditions of extreme rural poverty. Doing so, however, remains a largely undocumented territory of development research. While global views on mercury invariably lead to different priorities, it is clear

that extensive restrictions in mercury trade require extensive efforts at community capacity-building. The next sections suggest how such capacities may be influenced.

2.2 Small-Scale Mining in the Eyes of Governments and Aid Institutions

In recent years, development institutions such as the World Bank have emphasized the significance of the ASM sector as a contributor to poverty alleviation. This marks a stark transition from the policies of the World Bank two decades ago, where focus was placed on foreign investment through large-scale mining and ASM was widely viewed as an illegal hindrance to commercial property (Hilson, 2008). The mining policies of developing countries, however, have been increasingly criticized in recent years in terms of their univocal focus on large-scale investment without due consideration of community concerns (Pegg, 2006). A vast body of work has focused on escaping the "resource curse," expressing the idea that governments need to radically reform the ways in which minerals are extracted, for environmental, economic and political reasons.

The role of artisanal and small-scale mining occupies an increasingly complex space in such debates, as ASM on the one hand is a threat and on the other hand, and opportunity. The capacity of local workers adopt appropriate methods of mining has often been a political concern; poor capacities have often represented both a reason for not trusting indigenous miners with land rights but also, conversely, as a reason for supporting such miners more and supporting their rights as well as assistance programs. As Pegg (2006, p. 1) argues, "mining has a dismal empirical track record to date in poverty reduction....While the theoretical reasons to believe that mining can contribute to poverty alleviation are perhaps sound, the reality of mineral-led development has not lived up to its rhetorical promise." Referring here to the "promise" that large-scale mining would help lift poor countries out of poverty, Pegg's analysis also elucidates problems with existing approaches and evaluates the World Bank's recently concluded Extractive Industries Review as a dramatic new paradigm shift in thinking on mining and poverty reduction.

Pegg's analysis concludes "that mining can positively contribute toward poverty alleviation, but only if a variety of demanding preconditions are met." Among the preconditions, legalizing ASM is a necessity that has long been neglected, he argues. His key argument, in summary, is that large companies may be helpful in some ways to a country, but smaller-scale mining also has the potential to provide jobs to a larger workforce. Also making similar arguments are various studies suggesting why ASM contributes to poverty and how more attention should go towards sector support (Mwaipopo et al, 2004; Fisher, 2007; ILO, 2002; Hinton, 2006).

With support from the World Bank and UN agencies, some governments have begun to change legislation to provide formal recognition to the ASM sector, with recent legal developments in Ghana and Tanzania within the past ten years that recognize "artisanal" mining as a distinct legal activity that has the potential to contribute to poverty alleviation. Along with these developments in the sector, there is an ever more present need for finding new ways of improving the sustainability of the activity and decrease environmental impacts. As Hilson argues, the ad hoc nature of most of the policy reforms and development efforts to date has furnished the international community with few examples of how progress might be achieved; policies remain largely "on paper" only and fieldwork during development projects seems to go largely unaccounted for (Hilson, 2006). Agreeing with Hilson's critique of the World Bank, some interviewees in this study suggested that ASM is *not* best managed under the World Bank's Oil, Gas and Mining Program (as in the status quo), and that ASM should instead be more integrated within the context of rural development programs. As Hilson suggest, the World Bank's CASM (Communities and Small-Scale Mining) program has done little to offset the heavy bias in favor of multi-national mining in World Bank policy guidance services, leaving ASM to lurk as a poorly addressed field of development.

This study does not attempt to declare a bureaucratic judgment in this regard, nor does it provide an assessment of large commercial mining-oriented policy reform projects. Nonetheless, a working hypothesis could be this: projects that are focused on training miners and building their capacities at the grassroots level through technological education could arguably have strong comparative advantages as an institutional basis from which to promote and develop systems for legalizing and empowering artisanal and

small-scale miners. Arguably, large commercial-oriented mining policy reform processes (as undertaken by the World Bank) may intrinsically have less regard for the grassroots-level concerns about how people are depending on their environments; many of the policy reforms in Tanzania's ASM sector, for instance, were developed during a macro-level mining reform process for companies, but they left a policy framework in place that failed to identify what local environmental practices should be regulated or what pieces of land should be allotted to ASM in the first place. A hypothesis of this thesis, therefore, is that mercury-focused projects might, perhaps, have unique advantages. Certainly, linking mercury hazards and the rationale for legalizing miners provides a powerful combination of social and environmental knowledge bases; this link - connecting training with policy - necessarily forces the policymaking agents to think in interdisciplinary ways.

The rest of this chapter fills gaps in literature by reviewing global initiatives aiming to bring environmental protection and social empowerment together in artisanal mining communities. It focuses on the genesis of development models during the course of one major initiative, the Global Mercury Project, launched in 2002 by the United Nations Industrial Development Organization (UNIDO) to promote the adoption of technologies to reduce mercury use and emissions while strengthening capacities for improving efficiency, business skills and other development policies. It provides an overview of major findings from field activities in the GMP countries between 2003 and 2008, in order to demonstrate the prospects and challenges for integrative development programming in this burgeoning sector. The study focuses on the global challenges associated with mercury and small-scale mining. Integrated models of development discussion amongst diverse stakeholders can help to catalyze local innovation, technology-sharing, community planning and macro-policy reform. Before exploring the GMP, some key, growing concerns about development institutions and local knowledge are discussed.

Much scholarly attention has focused on why donors must valorize local-driven decision-making in supporting capacity-building policies for technology transfer. As Briggs and Sharp (2004) importantly point out, expressing a trend:

> "Indigenous knowledge is allowed to offer contained technical solutions that fit within the current scientific/development world-view,

> but not to challenge the content, structure or value system of this view" (Briggs and Sharp, 2004, p. 665)

While the above perspectives suggests how local views are frequently subsumed or neglected under broader frameworks, Conyers and Mellors note an equally problematic phenomenon – that myths are oftentimes being promoted:

> "...Many donor policy documents – including the reports of the Millennium Project – give the impression that the answers to Africa's problems are known. In reality, however, most the problems are complex and there are no easy solutions; if there were, the MDGs would have been achieved in the previous millennium". (Conyers and Mellors, 2005, p. 85)

The lack of transparency in development programming itself has been widely recognized as a problem in ensuring meaningful strategies and results are being pursued. Hilson's critical literature about mercury strategy, as noted above, has been part of the basis for his more critical analysis in recent years of the development institutions themselves. As an overarching theme, Hilson focuses on a "consultancy culture" that bypasses community-based research. He contends that systemic differences exist between "researchers who labour in communities" and "foreign development industry consultants" who, he says, are often more preoccupied with the objectives of securing further consultancy contracts than serving local interests. Emphasizing the need for a greater role of the former, he memorably writes: "consultants go to great lengths to establish relations with top executives of companies or donor agencies in order to ensure that local units [people in ASM communities] have minimal participation" (Hilson, 2006).

Non-participatory project governance is often portrayed as a widespread structural problem with aid. Siegel (2007) likewise has criticized the darker side of consultancy-driven work by suggesting that ASM and mercury issues were tantamount to a "gold rush for consultants." Jennings of the International Labor Organization suggests consultancy work is routinely haphazard: "Consultants can be as prone to 'gold rushes' as miners. Developing a package of measures that will bring about real and lasting change to the

people concerned takes time, information, dedication, and resources. If corners are cut, trust will be lost and the programs will fail" (ILO, 1999, p. 41).

These various analyses demonstrate why development planners must give sensitive attention to the risks of consultancy-driven programming and the need for communities to determine, guide and take ownership over the development process through participatory and equitable means. This study stresses that to meet development goals, these problems require constant critical assessment indeed. Clearly long term and sensitive, ethical and well-informed engagement with mining communities is prerequisite in order to influence any meaningful change in ASM conditions. Donors have frequently came into a project area and left after minimal engagement. While this particular study does not seek to provide a critical indictment of donor failures, however, the analysis centrally focuses on the view that international donors should increase support for South-South inter-regional knowledge-sharing and capacity-building and that mercury itself can be a way of turning a focus on "problems with ASM" into a more positive discussion of participatory solutions. The following sections thus provide primary focus on the planners' perspectives, reviewing results of the environmental health risks and drawing attention to the importance of promoting risk communication and mitigation strategies as a means of making the transition from hazard-focus to solution-focus. Training models can help to overcome environmental, social and economic challenges and emphasizes political empowerment is a necessary precondition for successful technological interventions. While various past development efforts have sought to reduce mercury-related problems, this study contends that development activities should seek to intertwine knowledge-sharing on environmental goals with concrete ways of improving social well-being; this calls for interdisciplinary knowledge that reveals interlinking values.

2.3 Linking Livelihoods, Commodities and Health

Development planners have widely noted that ASM uses problematic rudimentary techniques of mineral extraction and operates under hazardous conditions. Driven significantly by poverty, ASM is usually undertaken by workers with limited technical knowledge of the long-term impacts of their mining activities on the environment and on their health and/or with limited capacity to mitigate the hazards (Veiga, 1997). Ecological

impacts caused by ASM activities include diversion of rivers, water siltation, landscape degradation, deforestation, destruction of aquatic life habitat, and mercury pollution (Mol and Ouboter, 2004). Direct impacts of ASM on human health can include acute mercury poisoning, silicosis, neurological and kidney damage, cardiovascular and respiratory dysfunctions, as well as injury and fatality from landslides, cave-ins, and chronic physical overexertion. Workers often labor in tunnels with explosives and are regularly exposed to mercury, cyanide and other toxins (Hinton et al., 2003a).

Due to the informality and unregulated nature of many ASM operations throughout the world, the full extent of this activity and its ecological and health impacts is difficult to determine. Gold is easily sold and traded in markets that are not dependent on the stability of local governments; consequently, is by far the most important mineral extracted by ASM in developing countries. The number of ASM gold miners alone is estimated at 10-15 million people, including 4.5 million women and 300,000 children (Veiga and Baker, 2004). Because mercury amalgamation is simple and inexpensive, it is the gold concentration method most used in ASM. Mercury misuse in ASM has produced thousands of polluted sites with impacts extending far beyond localized ecological degradation, often presenting a serious, long-term health risk to individuals residing in mining regions.

Amalgamation employs metallic mercury to trap fine gold, with mercury often being discharged with contaminated tailings and/or volatilized into the atmosphere. International researchers have widely observed that the usual practice is to burn the amalgam in a pan or shovel in open air bonfires, with the inhalation of mercury vapor posing a serious health risk. Due to inefficient techniques, an estimated two grams of mercury are released into the environment for each gram of gold recovered (Veiga and Baker, 2004). Metallic mercury is also transformed into methylmercury in aquatic systems, which becomes biomagnified in the food chain. Communities reliant on fish, especially carnivorous fish, as a primary food source are particularly susceptible to accumulation of high levels of methylmercury and to neurological damage in cases of acute intoxication (Webb et al., 2004; Ikinguara and Akagi, 1996; Mergler 2002). Methylmercury can also cause sterility and is easily transferred from pregnant women to their fetuses, with effects ranging from spontaneous abortion to neurological symptoms

in the child (WHO, 1990). According to the International Labour Organization, the number of small-scale miners worldwide increased by up to 20% between 1989 and 1999 (ILO, 1999). Estimates made more recently, in 2004 by the United Nations Industrial Development Organization (UNIDO), indicate that there are as many as 20-30 million small-scale miners in more than 55 countries, roughly equivalent to the global workforce of large-scale mining. As this population continues to increase, numerous researchers and development workers have noted that there is an urgent need to develop the capacity of small-scale miners to minimize the risks associated with mining practices in their communities and shift toward safer, cleaner and more sustainable methods.

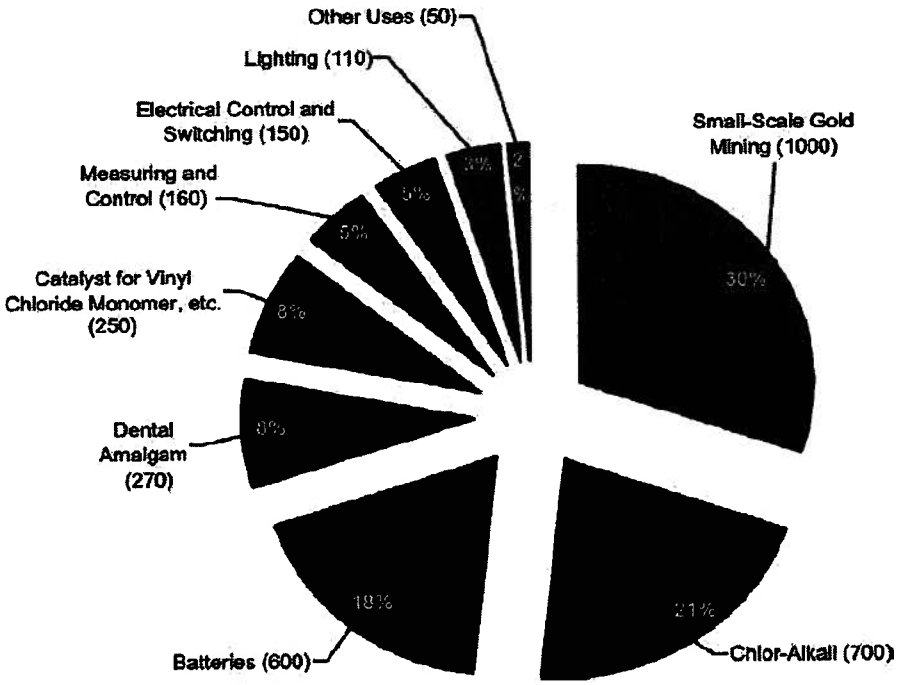

Fig. 1: Global Mercury Emission Sources

(Statistics from Swain et al, 2007)

Various projects have been attempted by the World Bank, the ILO, and other agencies. One of the largest projects in recent years, in terms of geographic scope, funding, and breadth of objectives was the Global Mercury Project (GMP) - launched in 2002, by UNIDO with support from UNDP and GEF, aimed at "removing barriers to the adoption of cleaner practices of small-scale gold mining" (UNIDO, 2002). The project sought to provide a platform upon which knowledge could be generated to meet diverse community challenges. In particular, it was envisaged that the GMP would spearhead the search for opportunities to reduce negative health and ecological impacts caused by mining through a series of multi-stakeholder consultation processes and capacity-building campaigns in affected communities.

Partnering with government ministries, local authorities, health organizations and miner associations, the project undertook assessments of health, ecological, social, economic, and technological factors in participating communities. This knowledge, it was hoped, could be effectively utilized to design and implement intervention strategies that target the causes of poor practice, ill health and pollution. Based on multi-method research processes during this project from 2005 until 2008, processes of discussions with researchers, field trainers, national and local government officers, NGOs and other relevant actors involved in the project, led to a variety of insights in an effort to move the global policy community away from the years of inaction and cultivate a spirit of collaboration on these challenges.

2.4 Global Responses: Turning Development Goals into Practice

Mercury has been used for centuries by gold miners and although mercury pollution in the sector is rising, environmentally hazardous and inefficient technologies are not a new phenomenon. As the UN noted in 1972:

> "...the equipment and methods currently used...are for the most part neither modern nor efficient...There is no doubt that not only can the methods and equipment be greatly upgraded and improved over a fairly short period but that the benefits to be obtained there-from are expected greatly to outweigh the cost." (UN, 1972)

Despite this anticipation of technology transfer in "a fairly short period of time," however, the reality over the subsequent three and half decades has not been as positive. As Handelsman, one of the GMP's policy advisors, points out, this UN declaration has gone largely addressed, and "it is now time to address the challenges: engage positively to improve conditions" (p. 7, Handelsman, 2006). Notwithstanding these rhetorical promises decades ago, it was only relatively recently that international agencies enacted strategies to follow up on the importance of providing technical assistance to small-scale miners, promoting the replacement of low gold recovery, high mercury consuming and discharging practices with more environmentally sound and high-yield gold extraction alternatives that either eliminate or reduce mercury losses.

Following a gold rush in developing countries in the 1980s and early 90s, the United Nations began acknowledging that both macro-policy and micro-community capacity-building strategies needed to be pursued. Thus, working with governments and community stakeholders from Venezuela, Ghana and the Philippines, UNIDO carried out programs to develop local capacity to assess and minimize mercury emissions caused by mining and provide high-level technical advice to government officials to design regulations and institutional reforms. Other UN agencies also became involved initially, such as the UN Economic Commission for Africa, which in the 1990s had field offices to address mining; the offices were subsequently taken down under UN restructuring reforms, leaving UNIDO as primary leader on ASM issues.

In 2001, with financial assistance from the Global Environment Facility (GEF), UNIDO identified hot spots with the potential for affecting international waters due to especially high levels of mercury pollution in streams and rivers. These efforts culminated in the solidification in August 2002 of a longer-term initiative, the GMP, supported by GEF, the United Nations Development Program (UNDP), and UNIDO, aiming to "demonstrate ways of overcoming barriers to the adoption of strategies that limit mercury emissions in ASM" (UNIDO, 2002). The GMP focused its efforts in six main pilot countries, each representing diverse ecosystems with connection to international water bodies: Brazil (Amazon), Lao PDR (Mekong), Indonesia (marine environment), Sudan (Nile), Tanzania (Lake Tanganyika) and Zimbabwe (Zambezi). This "demonstration" project, the first

global effort of its kind, is complemented by a suite of ongoing activities that are supported through participating countries' resources and/or bilateral programs, including Mozambique, the Philippines, and other regions.

As a capacity-building initiative that combines expertise in mining engineering, health promotion, economic development, and environmental planning areas, the GMP established the goal of serving as a link between researchers and practitioners to implement solutions. The countries participating in the GMP were selected based on the importance of ASM to their populations, preliminary assessments of mercury use, and support of the national and regional governments for capacity-building activities. Also a major factor was the potential of international waters to be impacted by mercury from mining. Most ASM activities within the six GMP countries are conducted within basins of major ecological significance and that cross geographical boundaries, e.g., basins of the Amazon, Nile, Lake Tanganyika, Zambezi River, and Mekong River. As such, the negative environmental impacts within these basins can affect many countries including those with ASM activities as well as neighbouring countries. The specific goals were: 1) to reduce mercury pollution of international waters by emissions emanating from small-scale gold mining; 2) to introduce safer and cleaner technologies for gold extraction and to train people in their application; 3) to develop capacity as well as the policy, regulatory and economic mechanisms that will enable the sector to minimize mercury pollution; 4) to introduce environmental and health monitoring programs; and 5) to build capacity of local laboratories to assess the extent and impact of mercury pollution (UNIDO, 2001).

Following its launch, the GMP conducted consultations with stakeholders to formulate a community assessment and capacity-building agenda—with numerous Task Force Meetings held in each of the countries. Studies have often noted that the implementation of technical solutions requires detailed knowledge of the cultural, social, economic and organizational context on a site-specific basis in addition to a thorough understanding of mercury exposure pathways and mobility through the diverse ecosystems (ILO, 2003; Hentschel et al, 2002; Jennings, 2003). Numerous studies have noted that a major barrier to the adoption of cleaner mining practices is that the impacts of mercury misuse are complex and difficult to see immediately, thus masking the dangers (Hilson, 2002a; Hinton et al., 2003b). Another major barrier is that many small-scale miners are unaware

of cost-effective ways to eliminate the hazards. Recognizing these barriers as nuanced and widespread, the participants of the GMP agreed that, to develop effective site-specific training programs, a diverse expertise was needed to create synergy in the process. Sociological surveys enabled communities to describe their customs, share knowledge on social, environmental and health aspects in the area, and give feedback on plans before further assessments and training programs were undertaken.

2.5 Supporting Regulation and Knowledge Transfer

One of the chief observations among planners was that in some cases, the illegality of mercury in the law has been a serious problem, such as in Brazil. The Brazilian Ministry of Environment has decried illegality while other agencies, particularly at the local government level, have been more constructively engaged with miners. Arguably, the UNIDO mandate to "develop national mercury regulations" (UNDIO, 2002, p. 32) suggests a way of transcending the problems of illegality to educate governments about the need for embracing incremental mercury phase-out strategies rather than bans. At the same time, contrary to the above assumptions in the official project mandate to develop "national regulations" on mercury, such measures may carry risks. They can be counterproductive if ultimately increasing risks of national corruption, excess bureaucracy, and misplaced energy in development programming. Should UN projects be focused on national regulation? Or should local governance agents be the focus?

These questions provided much debate and led to different development models, as discussed more in the later chapters of this dissertation. Asking such questions should be pursued contextually rather than in a policy vacuum and they should be tied to a broader political analysis of how UN agents engage political entities. Critical scholars such as Ferguson (1990; 2006) have critiqued the UN as an "anti-politics machine" that contributes to the building up of national regulations and central state powers while contributing to the criminalization of local workers. Project members in the GMP likewise emphasized that a contextual analysis of any given intervention should be attuned to the multiple trade-offs of how mercury may be politicized differently with different institutions. The UN, many suggested, should not act as an "anti-politics machine" but it should seek to understand and engage with political dimensions of development which influence the

attainment of GMP goals and the broader Millennium Development Goals that the UN has sought to pursue. National regulations might be required in order to address mercury proactively; they might, though, be a distraction as local governments and local custodians might be a more important area of focus.

While these issues were discussed early on by project planners in 2006, another key challenge early in the UNIDO project's development phases – and a related one since education about mercury often is only allowed if mercury is allowed – is that information on the effects of mercury on human health exists but is inadequately disseminated in developing countries. The particular pathways of exposure are poorly understood by local communities, many with no awareness that mercury is a hazard at all (Hilson, 2002b). A key early accomplishment of the GMP was gaining the approval of all the participating governments to conduct training in mining areas where illegal practices were common, thus allowing interaction with national, regional and local institutions. This led to the training of a cadre of regionally-based public health personnel in the assessment of clinical signs and symptoms of mercury poisoning and methods of improving environmental health in mining areas. In each country, partnerships were strengthened while integrated health and environmental assessments were conducted in pilot sites, using GMP protocols that provided a framework for combining biogeochemical, socio-demographic, and technical analyses (Veiga and Baker, 2004). While the UNIDO team was discussing the reasons for legalizing mercury and mining with governments, this arguably gave greater credibility in disseminating information in a way that could be respected by and convincing to miners.

Assessment results showed that symptoms of mercury intoxication are especially widespread in miners in Zimbabwe, Mozambique and Tanzania, with alarmingly high levels of intoxication found in miners in all six countries who spent significant amounts of time burning mercury amalgams. Neurological disturbances such as ataxia, tremors and coordination problems were found to be common among the African group of countries. In Kadoma, the main project site in Zimbabwe, 70% of miners (69% of child miners) were intoxicated, many of whom showed tremors, a typical sign of mercury-induced central nervous system damage. With extremely high mercury concentrations in breast-milk samples from nursing mothers in GMP communities, infants are especially at risk. In

addition to problems from mercury vapour, the assessments found that mercury methylation is a severe ecosystem hazard in project sites where practices of mercury and cyanide are used together (particularly in Zimbabwe), with particularly harmful impacts on the fish-eating communities where mercury accumulates in aquatic biota. In all GMP communities except those in Brazil, women and children engage in open-air mercury amalgamation at home, with entire families exposed to mercury vapour. Combined use of mercury and cyanide in mineral concentration was also identified as particularly dangerous and widespread, and practices that involve the amalgamation of whole ore (all the ore mined) also caused excessive amounts of mercury to be used and leaked into the surrounding soils and streams.

In effort to conjoin mercury hazards with solutions, technical and socio-economic studies in all participating communities assessed equipment and practices, needs of miners, and accessibility of new equipment. Transferring knowledge effectively from the assessments into community intervention requires careful attention to nuances in localities. Introducing training and demonstrating solutions to miners, families, and authorities requires emphasis on affordable and easily accessible 'homemade' equipment, such as amalgamation retorts (made of kitchen-bowls) which contain mercury vapour and decrease mercury use in the amalgamation process (Babut et al., 2003). In past years, as Hilson and Van der Vost (2003) and Hinton and Veiga (2003) have argued, UNIDO has used improper retort designs that cost much more than miners and that miners do not trust due to the invisibility of a "black box" phenomenon where miners cannot see how gold and mercury is being amalgamated. As training processes began, GMP efforts identified a variety of key aims: to reduce mercury use and promote safer, healthier and more cost-effective mining methods that are locally appropriate; strengthen community organization; improve access to equipment through micro-finance programs; enhance participation of miners in environmental planning processes; and assist authorities in the implementation of needed regulations and reforms.

2.6 Interdisciplinary Activism

Policies for mercury cannot be considered divorced of policies broader 'non-mercurial' concerns. This basic recognition was repeatedly emphasized throughout GMP

discussions. Furthermore, due to the importance of amalgamation to the ASM process and their immediate livelihood, convincing miners to eliminate mercury use because of health hazards is difficult. Particularly in the case of Africa, lack of sanitation, widespread infectious diseases, and limited access to health care have resulted in generally poor health conditions in ASM communities, such that any program directed exclusively at reducing the comparatively invisible health impacts from mercury is hard-pressed to garner local interest. As such, the capacity building policies that the GMP has promoted in conjunction with participating governments does not focus on mercury issues alone, but rather on the myriad of intertwined health, environmental, and socioeconomic challenges in these communities. An ecosystem approach to human health is emphasized as a way to build on the growing understanding of interrelationships among factors that produce ill health and ecosystem disruption and affect the feasibility of building sustainable ways to prevent and control these risks (Forget and Lebel, 2001; Mergler 2003, Rapport and Mergler, 2004). This approach focuses, above all, on the inextricable links between humans and their biophysical and social environments and is based on three methodological pillars: *transdisciplinarity, participation,* and *equity* (Lebel, 2003), each pivotal in the GMP action plans for capacity-building.

Transdisciplinarity refers to collaboration by researchers and practitioners from complementary disciplines through a process that allows them to exceed their own discipline to generate new logical frameworks, new methods, and new institutions born from the synergy that ensues from this collaboration (Lebel, 2003; Dakubo, 2004). It is worth noting that previous projects on mercury management in developing countries have tended to adopt frameworks based on hazard awareness, technical training or regulatory changes, with short-term agendas and limited resources for integrating multiple disciplines and strategies (Hilson, 2002a, 2005). Moreover, authorities have tended not to combine health and environmental planning processes in mine sites and are often unfamiliar with ways to support educational programs on the ground (Hinton et al., 2003a,b). Seeking to better connect miners, field practitioners, experts and authorities, the GMP model involves team members with diverse expertise in community development disciplines to bridge diagnostic, risk communication, and knowledge translation models. The collaboration to build sustainable solutions through a transdisciplinary approach proved critical in developing the GMP community training

curriculum (Table 1), which recognizes that each community faces different challenges and that the need to alleviate poverty and address malaria and HIV/AIDS is primary in many GMP communities where mercury pollution is also a problem.

As seen in the table below, the project's diverse training curriculum was designed to remove barriers to the adoption of cleaner practices by demonstrating ways of reducing mercury hazards as well as other occupational health and environmental problems, improving miners' income through better gold recoveries, implementing disease mitigation and health care measures (vaccinations, HIV/AIDS prevention controls, prenatal and postnatal care, etc.), and improving sanitation and management of waters—stimulating awareness of the interconnectedness of issues and how solutions can be realized.

Table 1: Interdisciplinary Model for Training the Trainers

(Vision for Interdisciplinary Education and Training Curriculum in ASM Communities: Modules for the Train-the-Trainer Process)

Training Modules	Knowledge from Community Practice	Knowledge from Academic Discipline
Module 1: How to Produce More Gold	Underground mining methods: winches, windlasses, Wheelbarrows dewatering	Mining Engineering
	Mine safety: ground stability; ventilation; timbering; personal protective equipment	Mining Engineering and Occupational Health and Safety
	Alluvial mining methods: control of siltation; gravity concentration	Mining and Mineral Processing Engineering; Watershed Management
	Mineral processing methods: liberation and concentration of gold: crushing and grinding; gravity concentration; safe extraction with mercury	Mineral Processing Engineering
Module 2: How Mercury Makes Us Sick	Pathways of exposure: metal and methylmercury; vapor, skin, ingestion.	Environmental Toxicology
	How to recognize symptoms	Healthcare
	Effects on children and women (esp. pregnant women)	Epidemiology; Gender Studies
Module 3: How to Use and Re-use Mercury Safely	Safe extraction of gold from concentrate: amalgamate concentrate--not whole ore.; use amalgamation barrels; properly dispose of amalgamation tailings;	Mineral Processing Engineering; Occupational hygiene
	Burning amalgam in retorts to contain vapor (outdoors and away from houses)	Mineral Processing; Occupational hygiene

Module 4: How to Make More Money	Participating in the formal economy: how to become a legal miner; how to secure mineral rights	Law, Economics and Sociology
	Managing money: double entry bookkeeping	Business and Accounting
	Selling gold for a better price: government and cooperative gold buying/marketing schemes	Economic Policy
	How to access more efficient equipment: micro credit and renting	Economics and Business
	Alternate forms of organization: how to form co-operatives and partnerships	Business and accounting; Political Science
Module 5: How to Protect Water Supplies and Improve Sanitation	How mercury behaves in water: siltation and mercury transport; bioavailability of metal mercury; methylmercury	Hydrology and Toxicology and Chemistry
	How to manage animal and human waste: bacteria and parasites; how to build toilets	Water and Sanitation Engineering;
	How to access clean drinking water: hydrological cycle; the water table; rainwater management	Hydrogeology; Integrated Watershed Management
	How to manage mining waste: tailings impoundment; reclamation	Environmental Policy; Civil Engineering; Agricultural Science
Module 6: How to Prevent HIV/AIDS, Malaria and other Diseases	Prevention of HIV/AIDS transmission: condom use; empowerment of women; safe use of scarification implements	Healthcare; Epidemiology; Gender Studies; Anthropology
	Malaria: use of netting and other preventative measures; how and where to obtain treatment	Healthcare; Epidemiology
	Mercury poisoning, tuberculosis and other diseases	Healthcare; Toxicology

Although implemented in limited ways in the pilot phase of the project thus far, it was envisaged that training should also encourage strengthening community organization to legalize miners who do not currently possess land rights. Some stakeholders felt that this idea is "too political;" however, some critics felt that to be able to improve one's technology, one would have to become legal first (Siegel, 2007). Arguably, this chicken-and-egg equation should be studied further before promoting any one linear ordering for development strategy. In some cases, waiting until miners are legalized might simply preclude education at all, and limits the nature of participation among stakeholders.

Participation, a second pillar of the ecosystem approach to human health, is fundamental to enable affected populations to initiate solutions in a way that can be sustainable and maximize limited resources. Legalization certainly remains, in many scenarios, a prerequisite to being able to *participate* at all in government-monitored training programs, and trust between governments and miners may be difficult to cultivate if legal status is not recognized. The GMP sought to emphasize participatory processes in developing capacity-building models that are country-specific and community-specific, wherein community members identified what equipment is needed most and what techniques should be demonstrated. The project sought to involve as many community members as possible in the training workshops and to encourage participation of new players. To reach broad audiences, communication methods were locally determined to build upon the cultural roots and institutional strengths of the communities, such as using soccer events, music, street theater, and circuses to attract people to training workshops; education events at schools and through religious organization; and radio and television campaigns to promote awareness of mining issues as well as GMP activities (Scoble et al, 2006; Metcalf and Spiegel, 2007).

Enhancing participation is especially vital in understanding the workings of the Transportable Demonstration Units (TDUs)—training units which provide platforms for community training on improved technological options for mining and mineral processing, as well as environmental health and safety (Fig. 2). Parallel to the activities of the TDU education center, media campaigns were designed to draw people to these events and address the critical misperception that mercury is not dangerous because, like HIV/AIDS, its toxic effects are not immediate. GMP participants noted that the success of many

previous training initiatives was limited because they relied upon permanent, immobile structures for technological demonstrations which were not adaptable to new locations and thus restricted participation. In view of these lessons and the fact that artisanal miners are typically mobile and transient, the policies were agreed upon, among governments and GMP advisors, that mobile units should be designed to travel to different highly-populated zones to maximize community participation and bring solutions to miners where they work.

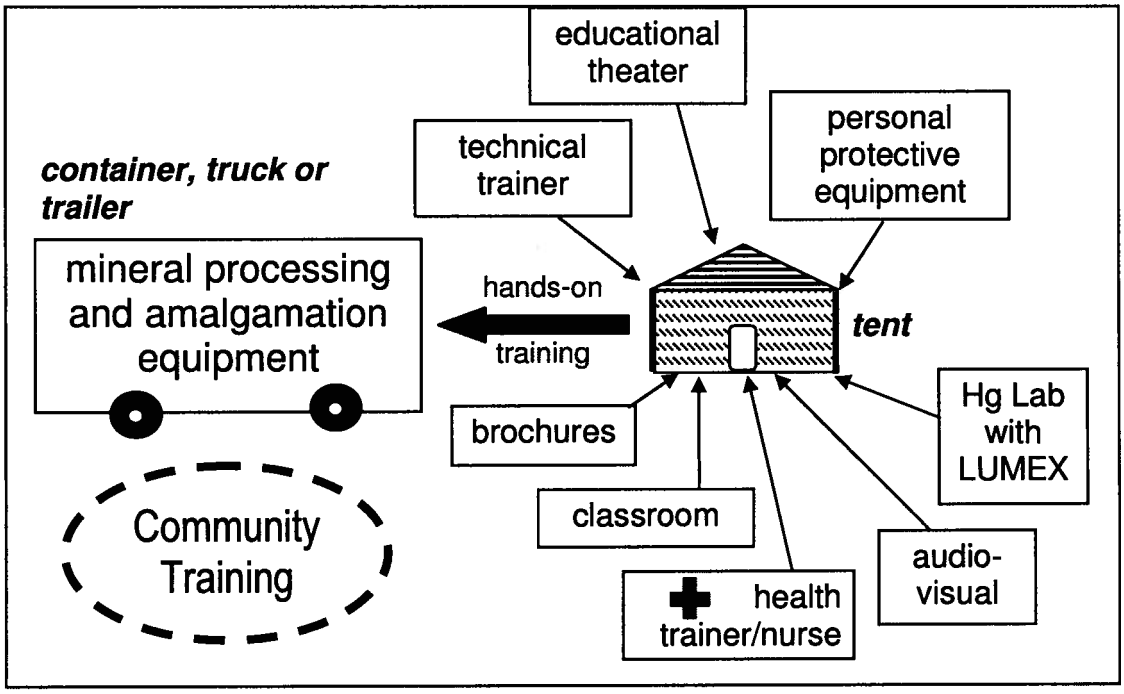

Fig. 2: Model for Transportable Demonstration Unit

Observations made throughout the work of the GMP led to the strong conclusion that *equity*, a third pillar of the ecosystem approach to health, also needed to be a benchmark in the development of GMP strategies to address disproportionate burdens in especially vulnerable segments of communities. In particular, the consultation processes revealed that gender-specific approaches are indispensable. The recognition of the important role of women in ASM has taken on considerable importance as more than 30% of the world's artisanal miners are women, the majority of whom work in the mineral processing

aspect—including amalgamation with mercury (Hinton, 2003). As women are also predominantly responsible for food preparation, they are in an excellent position to address health risks associated with consumption of mercury-contaminated foods. Because women are often associated with transporting and processing materials as opposed to digging, they are not always identified as "miners" (Sasapu and Crispin, 2001; Hinton et al. 2003a), and thus there is an especially important need to promote the inclusion of women in community planning processes at miner association workshops and other venues (Hinton et al, 2006). GMP efforts were designed to focus on training women specifically, reducing exposure risks to women (especially pregnant women) and their families, and promoting gender equity in community planning; a GEF gender specialist was involved (albeit briefly) to evaluate how gender played a role in the project.

GMP field work also established that an important component of equity relates to power differences among the stakeholders involved in gold and mercury circulation, and in this regard, the micro-politics of labor remain an indispensable part of the capacity-building process. In many ASM communities in Zimbabwe, Brazil, and Tanzania, those who buy the gold and/or sell mercury to the miners (so-called middle-men) also own and control the only accessible mineral processing centers in the area and thus hold great influence over the practices of the miners (Dreschler, 2002). Understanding these sensitive social dynamics is important to develop effective ways to promote change. After workshop discussions, it was concluded that the GMP team would organize workshops with miners and milling center operators alike to promote mutually desirable and efficient ways of eliminating health and ecological hazards. The nature of engaging power relationships between "bosses" and "workers" remains a widely undocumented field of study. Some experts often referred to the bosses as "corrupt middlemen," as expressed, for instance, in the analysis of Hilson and Pardie (2006, p. 106):

> "There is mounting empirical evidence which suggests that dealings with the monopolistic middlemen who supply mercury, purchases of costly medicines to remedy ailments caused by mercury poisoning, and a lack of appropriate safeguards and alternatives to amalgamation, are preventing gold miners from improving their practices and livelihoods. The solution to the problem lies in breaking this cycle of dependency,

which can be achieved by providing miners with robust support services, mercury-free technologies and education."

Whether these vilified characterizations of "monopolistic middlemen" (later referred to in the above article as "corrupt middlemen") are appropriate or not could be the subject of future workshops and certainly requires a contextual understanding of any given mining community. Some "middlemen" might not be "corrupt" and they might be on fair terms with their workers – or might perhaps be simply seen as "opportunistic." Some in the GMP team suggested that the power dynamics in local communities should be discussed interactively with stakeholders throughout the implementation of the TDUs, while empowering miners to improve their practices individually. The TDU system was envisioned as forums in which community members could collectively plan safer, cleaner, and more cost-effective practices through equipment-sharing and revenue-sharing arrangements. Although attempts to create formal business cooperatives had generally not been made in mining in the participating countries, this kind of approach may also prove valuable in a number of communities where individuals have little money to invest in equipment and currently receive exceptionally low prices for their gold in exploitative systems. Examples are later discussed in detail in Chapter 3, profiling efforts in Tanzania and Sudan.

2.7 What Planners Can Learn from Political Ecology

As the above analysis has suggested, mining technologies and community health are inextricably linked with political challenges. An interdisciplinary approach, as described above, has encouraged the design of an international assistance model that seeks to address mercury in the broader context of challenges: introducing healthier and safer technologies, promoting equitably business structures that recognize the different power dynamics in mining areas, promoting women's rights, and recognizing that multiple legal and institutional factors are connected. Glossing over these approaches may be tempting for scientific experts who study what might superficially appear to be "non-political" factors; yet this analysis so far has suggested why an interdisciplinary approach needs very much to engage those "undocumented" dynamics that concern the political

decisions that planners inevitably confront, knowingly or unknowingly. Recognizing the need for studying the synergy between political processes and local engineering practice in ASM provides a critically important arena for UN development agencies in particular. Given the popular tendency to think of United Nations missions as somehow "neutral", this section will suggest why understanding the approaches grounded in a realm of emerging scholarship on "political ecology" is particularly important.

The idea of "political ecology," although imbued with many meanings and connotations, has most often been identified as an amalgamation of political economy and ecological realms of knowledge formation (Duffy, 2006). In this section I will suggest why political ecology approaches provide a useful area of guidance that can help researchers as well as development planners of all types when approaching issues related to ASM and mercury. Contrary to the idea of "neutral" intervention, political ecology scholarship has widely critiqued the pretense of a "neutral" space for development; it suggests a turn towards integrative and introspective thinking that "multi-layered analyses" that link social, political, economic and environmental phenomena at linked geographic scales (Peet and Watts, 2004). This "multi-layered" nature of political ecology, as Le Billon's analysis shows, has tended to elude other popular social scientific disciplines in the mining sector, in political economy and geopolitical studies notably, let alone the natural sciences. Unlike other disciplines, there has been considerable impetus within political ecology literature to emphasize not just positivistic expressions of mining and its controversies, often predominantly materialistic, but rather to emphasize the multi-dimensionality of viewpoints and the discourses they engender (Le Billon, 2007).

Some scholars have criticized political ecology for too much obsessing about politics and not enough attention to the "ecology". This suggestion appeared in Peter Walker's article in 2005, "Political ecology: where is the ecology?" (Walker, 2005). In a more critical tone, in his book *Eroding the Commons*, Anderson (2002), eschews the very term 'political ecology', preferring instead 'politics of ecology' as effort to minimize the a priori emphasis on politics as the foregrounding feature of social-ecological relationships. Regardless of whether ecological factors are treated as totally "separate" from humans or not, while it is certainly true that political dimensions of debate are more explicit in some cases than in others, my approach in emphasizing "political ecology" does not

dwell on the inherency of any particular political dynamic in socio-environmental relationships. The point isn't to emphasize nature's inherency but rather to emphasize pervasiveness and influence of politics and the multi-dimensional possibilities of any given theory or action that links social and environmental worlds. Robbins (2004) suggests that political ecology, a set of conceptual movements, can provide a means of moving away from a view of the environment just in terms of the destruction of nature or the policies that affect the environment; instead, for Robbins political ecology allows us to examine the ways that nature is 'produced' by human and nonhuman actors; Stott & Sullivan (2000) and Forsyth (2003) also explore debates about the use of science in constructing environmental narratives. For political ecology approaches, consequently, the critical conceptual movement encourages an understanding of inter-linkages of political dynamics in the activities of government ministries, scientists, international NGOs, local communities, private businesses and international financial institutions as 'producers of nature', among other phenomena (Duffy, 2006).

Political ecology approaches thus provides useful insights for examining evolving ASM-sector debates, which are located in a myriad of shifting debates about diverse features that are directly and indirectly related to mining. We might look to the politics of microfinance, the politics of hazard diagnosis, the politics of mineral processing, and various other dimensions that cannot be fully captured within the confines of one study. The politics of delivering UN assistance is itself a matter where political ecology theory could help workers to understand how decisions and discourses in UN buildings in New York or Geneva have links with decisions and discourses that affect mercury and ASM in Asia or Africa or Latin America. ASM in a political ecology analysis can be seen across diverse planes of historical analysis, and some particularly alarming instances of discourse may be worth pointing out here. ASM has frequently been associated with corruption in Africa in fuelling resource wars (Le Billon, 2001), creating a negative view of the activity that Le Billon suggests often precariously feeds the problems of criminalization. Lahiri-Dutt (2006), focusing in India, likewise challenges the language of the "resource curse" for its general bias in favor of commercial mining and its association of illicit workers as looters, environmental destroyers and smugglers.

Mining engineers who have led the UN's mercury programs have, notably, been sensitive to the need for political empowerment of miners in order to reduce environmental problems. If one advocacy merits particular attention, it may be what Veiga and Beinhoff argued in 1997 – which would prove to be a critically important argument that still caries ever-more persuasive power: "Legal and transferable titles are essential to organize and transform this informal industry...and must be understood as a pre-requisite to change behaviour and transform ...underprivileged people into citizens" (Veiga and Beinhoff, 1997). This sensitized discussion of the relationship between citizenship and politics, appearing in an overarching discussion of mercury pollution, demonstrates a clear rationale for engineering projects to tread into the territory of political ecology theory. Addressing the rights of miners seems to carry more and more importance in recent years, particularly as multinational mining companies seem to occupy greater tracts of land and peasant miners are often displaced (Hilson and Yakovelva, 2007). Questions of national and transnational "citizenship" abound in the ASM context, with the rights of miners playing a large role in determining how effectively they can be regulated.

If political ecology suggests a change in the way that conventional planners and engineers do business, it may be to encourage an awareness of the unpredictable and multi-dimensional possibilities of any one advocacy, requiring sensitivity to how advocacies get actualized in the world. While the above sections have explored the need for interdisciplinary approaches, this thesis would suggest two particular areas where common aspirations that can be further understood by political ecology approaches: 1) how to legitimate miners' livelihoods through regulation and 2) how to promote awareness of the hazards of mercury. These areas are each examined in turn below.

2.7.1 The Political Ecology of Regulating Miners

Regulating miners was, from the beginning, a GMP objective. A "political ecology" approach may suggest how regulating miners takes on multiple meanings and possibilities. Through the GMP, the United Nations has opened up numerous collaborative opportunities, embracing an ecosystem approach to address these challenges and an adaptive learning process that shows the need for careful attention to

multiple interpretations among stakeholders. The GMP's growing emphasis on the role of transdisciplinary, participatory, and equity-focused initiatives, is likely to generate valuable insights and lessons for other ecohealth research and projects that seek to integrate health, ecological, and economic concerns in community development. From the numerous conferences and task force meetings held by team members to identify the barriers to mercury abatement, it appears that one very positive outcome of the GMP's pilot phase should be to give more focus on rights of miners in the future. Yet, how to promote "rights" may itself be understood in diverse ways.

While many theories of "rights" can enter into a planner's psyche, Hernan De Soto famous theories about property rights (De Soto, 2000) have become a particularly fashionable basis for rights-based discourse. His work, in short, has become a well-known reference point in development literature for promoting land tenure. The World Bank has adopted the approach insofar as participants at CASM meetings often emphasize the need for creating ASM legislation. Several of the policies and laws UNECA identifies as "best practice" in its most recent ASM compendiums (UNECA 2002; UNECA 2003) likewise been oriented towards mining rights for ASM. However, Musembi (2007) interrogates the ambitious claim that the procedural act of formalisation of property rights has a causal link with the empowerment of poor people. He explores this claim primarily through examining the work of De Soto, in light of similar arguments made in earlier policy prescriptions on formalisation of land title in rural sub-Saharan Africa, particularly in Kenya, which has had the longest history of experimentation with formal titling in the region. Musembi's point is to suggest that contemporary arguments on property rights (Musembi focuses on De Soto's arguments) often ignore lessons learnt and therefore reproduce five shortcomings of earlier arguments linking formal land title to productivity in sub-Saharan Africa:

> "First, a narrow construction of legality that equates legal pluralism with extra-legality. Second, an underlying social evolutionist bias which presumes that individual ownership is ultimately inevitable for all social contexts. Third, an unproven link between formal title and access to credit facilities. Fourth, a narrow understanding of markets in land to refer only to 'formal markets'. Fifth, failure to acknowledge

> that formalisation can result in both security and insecurity."
> (Musembi, 2007, p. 1457)

While further literature on this debate is not the focus of the present analysis, there is reason to suggest that the current recasting of formalisation of property rights systems as empowerment of the poor easily sidesteps the issue of substantive redistribution and downplays the role of the state in such redistribution. Hilson's analysis (2007) of the World Bank formalization initiatives in the ASM sector suggests that they have been ineffective in practice because of poor enforcement and unrealistic demands placed on subsistence operators. Intensely bureaucratic systems of registration are often required of miners. Through discussions with miners in Indonesia, Tanzania and Zimbabwe during my fieldwork, I encountered countless stories of how miners did not know how to register for mining claims, although many of these miners indicated clearly that they would like to possess claims. The danger emerges that miners, while never given rights, could later be blamed when they do not possess rights, particularly if the land is sold to other parties who want to pressure miners off their land.

In Africa, what is overlooked particularly by policymakers is that mineral rights are superimposed, only recently supplanting the traditional systems of land tenure that have been in place for centuries. Fermin-Sellers (1996, p. 1) captures the essence of the resulting problems in the following passage:

> "Underlying and exacerbating [Africa's problems]...is a more fundamental problem: the nature of African land tenure. Throughout Africa, property rights to land are fluid and insecure. Private property, state ownership, and communally defined rights coexist in an ever-changing mix. Definitions of communal tenure continually shift. The farmer or entrepreneur who claims land under one property rights system can never be certain when (or if) others will challenge his claims; nether can he predict whose claims the local community or state will uphold".

Mineral rights now take precedence over traditional land rights, a direct result of the recent reworking of mining legislation to emphasize that whilst traditional land ownership still stands, all mineral deposits are the property of government. The problem is that the policymakers and donor officers who have initiated these legislative changes have hitherto done little to desensitize the very ASM populations which stand to be affected by such legislative change. One of the GMP's major successes at the level of policy has been to introduce a legalization system for miners in Indonesia, at the local government level in Kalimantan, as discussed further in Chapter 4. Yet unless the government actually makes efforts to assist miners in benefiting from such registration systems, there may be little value of the reform in the foreseeable future.

As part of the mining sector reform process – and a move often seen as a means for increasing investor confidence among the incoming foreign large-scale mining contingent that has surfaced under reform – small-scale mining has been legalized throughout sub-Saharan Africa. In many countries, including Ghana, Mali and Tanzania, prospective operators are required to undertake a series of drawn-out bureaucratic tasks in order to secure a parcel of land through legal channels (Bugnosen (1998) provides an overview of such legislative dimensions; and Fisher (2007) discusses the inequalities that surround mineral tenure in Tanzania). This approach, however, appears to have further marginalized the subsistence artisanal mine operator, who now finds it exceedingly challenging to secure a mining license. Where a political ecology approach can assist planners is to demonstrate how politicizing the value of "on paper" policy reforms needs to be accompanied with an equally extensive politicization of the multiple scenarios that may ensue from policy changes. In this regard, policy and governance – how institutions actually work – need to be studied rigorously and continuously over a period of time.

Hilson (2007) argues that the backlash that has since occurred over the unavailability of viable land for ASM has left the sector in a state of flux, often fuelling violent clashes with large-scale operators. One might wonder: why are development officers advertising the very licensing systems instituted for small-scale mining as "best practice"? Importantly, few of these policies were developed in collaboration with miners, just as environmental regulations – such as mercury regulations – are often not discussed with stakeholders prior to their implementation (a problem that the GMP team has sought to correct).

Conyers and Mellors (2005, p. 85) reflect upon how the "current aid discourse, like 'new' public management discourse in general...is characterized by the constant 'invention' of new 'fashions' – that is, new solutions or approaches, which displace the previous ones before the latter has been properly tested". The approach the development industry has taken to regularize and deliver assistance to ASM has arguably been much the same as the past: fruitless efforts to compartmentalize small-scale mining in the 1970s for policy and legislative purposes were followed by a technical, productivity-led approach in the 1980s, itself supplanted by a broader socio-economic approach in the 1990s (Jennings, 2003). The point in asking these questions and drawing such criticisms is not to dwell on the failures, but to encourage planners to find innovative ways of negotiating these risks. The GMP's successes in helping to facilitate a legalization system in Indonesia, or in working with the local government in Brazil to legalize miners, for example, should be viewed as important preliminary steps that require careful further attention.

2.7.2 The Political Ecology of Mercury Awareness and Reduction

If political ecology can help planners to "think twice" about the meaning of a particular environmental advocacy in order to ensure that it equitably achieves its intended goal, one of the common advocacies should be confronted immediately: the advocacy for doing *assessment*. Doing an environmental or health assessment may be a good idea; but it too can also be disempowering if community members are not involved equitably in the process, or if the results serve to stigmatize workers in unhelpful ways. Promoting hazard awareness is an idea that sounds good in theory; yet promoting awareness of hazards without building capacities can be disempowering. A person who might learn that he or she is engaging in a dangerous activity might be pleased to know that the toxic substance he or she is using is bad for health; it can be quite empowering to know this information, as many interviewees suggested in this study. However, many interviewees also suggested that it can be disempowering and stigmatizing to be told that something is wrong with them unless there is a realistic solution that is available or can be available in the near future. As Tschakert and Singha (2007) argue, vulnerable ASM groups in Ghana have been made to have "contaminated identities" as result of the countless mercury studies that have done little to address solutions for mercury; the identification

of miners as persistent polluters can feed into larger risky social narratives about criminality and abhorrent behavior, even leading to more mercury pollution as a result.

A political ecology approach might also help planners to realize that mercury reduction itself might not necessarily the "ultimate aim" as far as short term project objectives go. The GEF and the other donors have often emphasized that success means reducing contamination. Yet, if a project reduces mercury pollution in the short term because the military take over the mining area and criminalize all the workers, this might not be the best outcome from the point of view of environmental protection; miners might soon turn to other environmentally destructive practices as a result, and livelihoods may be destroyed as well as ecosystems. In this regard, it is important for planners to appreciate that adapting to contextual circumstances and political risks requires integrative approaches. Much has been written on the subject of "adaptive management"; Armitage et al (2008), argued that there is a "paradox of learning" by which development planners and managers must necessarily re-think narrow models while also honing in on priorities. Some stakeholders in the GMP, as discussed later, suggested that the primary "success indicators" should not be quantitative emissions reductions but qualitative dimensions of institutional reforms and how they influence ASM capacities. The difference for some people is, in short, whether the GMP is primarily concerned with "removing barriers to the adoption of cleaner technologies" or "reducing mercury use by whatever means possible...including aggressive police intervention."

Writing on the link between political ecology and managerial strategizing, Adger et al (2001) provide important analysis on the ways in which technocratic discourse of hazard reduction has little resemblance with actual experiences in the field. Political ecology approaches, they suggest, help to show the discrepancies and overlaps between populist discourse that portrays local actors as victims of external interventions, bringing about degradation and exploitation, and various other managerial, technological and hyper-scientific discourses – all of which might be able to find commonalities if projects are framed in the right way and with the right stakeholder participation. Managerial discourses, they suggest, are not necessarily problematic on face; but they need to be attuned to the multiple possibilities of their serious political risks. Gough (2002) likewise provides a useful analysis on the merits of "thinking and acting locally and globally,"

suggesting how Western science and environmental education in a global knowledge economy creates serious risks whereby global knowledge can overshadow local customs and traditions. Environmental justice literature has also provided a popular theoretical body of research that planners may turn to for insights. While political ecology encourages multi-dimensional approaches, and an integration of various discourses in an analysis, the emphasis is not on any one conclusion but rather on the need for diversity. The central goal of the rest of this thesis is not to map out a political ecology perspective but rather to attempt to explore the managerial world in ways that appreciate a multitude of questions and strategies. The central goal is to draw attention to how regulating mercury, rather than banning it, can open up multiple important opportunities to actually reduce the hazards of mercury while also pursuing the goal of supporting people's livelihoods.

Chapter 3 provides the framework for action that was developed through stakeholder consultation as part of this study, attempting to provide a platform for discussion among GMP stakeholders that emphasized the diversity of potential strategies for abating mercury pollution. This framework was circulated to project team members in all the participating countries and became a basis for debate and collaboration. Chapter 4 then examines how these ideas were brought into fruition in the field, highlighting some of the achievements and some of the pragmatic and critical questions about "success indicators" that emerged. This format of presentation necessarily portrays only fragmented accounts of different country initiatives; and while fragmented accounts run the risk of not saying enough about the complex political environments in which each intervention occurred, the bringing together of multiple fragments draws attention to how mercury, when legalized, opens up innumerable possibilities that have manifested in multiple regions. The study proposes further development and discussion of this policy framework to assist institutions in cultivating educational, economic, and legal strategies for mining regulation and development while learning from diverse country experiences.

CHAPTER 3: DEVELOPING A UN POLICY AND GOVERNANCE STRATEGY

3.1 Overview

In light of the considerations and challenges identified in the previous chapter, this chapter presents the Strategic Plan on Policy and Governance, a practical text that was developed early on as part of this study to serve as a guide for discussion purposes with teammates in the United Nations initiative. It sought to lay out some thematic areas of importance while leaving room for any additional contributions or modifications.

In 2006, the Global Mercury Project (GMP) launched the Strategic Plan on Policy and Governance, presenting an action framework to promote the strengthening of policy and governance on issues of environmental management, capacity-building and technology transfer in the artisanal and small-scale gold mining (ASM) sector, with particular focus on the minimization of mercury pollution. This framework builds on initiatives previously carried out by the Global Mercury Project (GMP) and objectives identified through global, regional and national task force meetings and local stakeholder consultation processes. The Strategic Plan takes into account existing regional plans, strategies, and ongoing activities. It is composed of a strategic text, Action Framework, Table of Main Issues Considered, and Action Profiles comprised of main highlights and outcomes of accomplishments to date.

The GMP, supported by the Global Environment Facility (GEF), the United Nations Development Program (UNDP), and the United Nations Industrial Development Organization (UNIDO), is a joint initiative with governments to demonstrate ways of overcoming barriers to the adoption of best practices in ASM, waste minimization strategies, and pollution prevention measures that limit contamination of international waters. Working with authorities and public and private sector organizations, the GMP provides assistance in the development of policy, technology support, and capacity-building, at institutional levels and directly in ASM communities. In its pilot project phase, GMP activities focused in six countries – Zimbabwe, Tanzania, Sudan, Brazil, Indonesia and Laos. The Strategic Plan on Policy and Governance complements the

strategies of the GMP Education and Awareness Campaigns and Technology Demonstration Units, which are described in other reports. Though not comprehensive of all details, this report highlights the main accomplishments, lessons learned and outcomes of the GMP Policy and Governance Initiative in its pilot phase to inform further developments.

The world-wide reduction of mercury use and pollution in mining, as called for by the Global Mercury Project, requires action at all levels of society: training; information; communication; methodological tools; capacity building with financial support; transfer of know-how; knowledge of sound and proven cleaner technologies; as well as policy development, law, and regulation. In more than 50 developing countries, there are as many as 15 million artisanal and small-scale miners who use mercury extensively in gold extraction and processing. As many as 100 million people may be intoxicated by mercury from ASM, which is the single largest source of mercury releases into the environment from intentional use. The urgency of the situation has called for reinforced global efforts to address hazards at their source, by removing barriers to the introduction of cleaner technologies, and by strengthening policy and institutional measures that will support positive and sustainable change. Building on the knowledge from the GMP Environmental, Health, Sociological, Socio-Economic and Legal Studies, the GMP has been executing targeted initiatives assisting participating governments, on issues ranging from national legislation and institutional capacity to community training, with lessons applied to projects with Governments in other countries as well. A key goal of this report is also to draw recommendations for future projects of a more global reach, for instance, in the promotion of the International Guidelines on Mercury Management in ASM.

The effective involvement and coordination by all concerned stakeholders is seen as essential for achieving the aims of the Global Mercury Project. Governments, the driving force of the implementation programs and activities, have been encouraged to seek the assistance of UNIDO in any identified or related technical, strategic or policy matters. The mobilization of non-governmental organizations and existing ASM institutions has been important to ensure the practical application of environmentally sound management. The enhancement of information exchange and education at all

levels is of paramount importance for achieving the aims of the GMP, with active participation of governmental institutions. This report emphasizes that sustained progress requires ongoing and dynamic processes of decision-making, policy development and field implementation with broad, inclusive and active stakeholder participation.

3.2 Vision

Building on the achievements of the pilot phase of the GMP, the members asserted a vision that the improvement of environmental management in ASM must be accessible to all stakeholders, emphasizing the minimization of mercury use, pollution and exposure and the strengthening of capacity-building.

3.3 Aims

The fundamental aims of the Policy and Governance Initiative within the GMP were the removal of barriers to the improvement of environmental management in ASM, particularly the prevention and minimization of mercury use and pollution, the active promotion of the transfer and use of cleaner technologies, and the strengthening policy and institutional measures that will support positive and sustainable change.

3.4 Guiding Principles

A set of interrelated and mutually supportive principles were developed to support the implementation of the GMP policy and governance activities described under Sections V, VI and VII below. These are:

a) **To promote and support existing national and regional policy initiatives** for sustainable development on ASM issues, linked with efforts in progress;

b) **To collaborate with existing institutions and programs** to develop policies encouraging use of cleaner technology in ASM and the reduction of mercury use;

c) **To strengthen the capacity of governments to implement policy and sustain the capacity and technology** after GMP efforts have been completed;

d) **To tailor activities to individual countries based on a bottom-up needs - assessment process**; given the specific circumstances of the different countries concerned, each country should be encouraged to identify its own policy needs;

e) **To involve experts in designing communication tools** for creating awareness at the highest level of governments, and other institutions, to promote GMP goals;

f) **To engage and motivate selective partners to bring added value** to making progress in the short and long-term, **including public-private sector partnerships;**

g) **To undertake periodic review** of policy activities in relation to agreed indicators;

h) **To promote principles of transparency and accountability** in government initiatives and programs;

i) **To integrate gender-specific strategies**, as well as education and training for women, in formulating relevant policies, and to promote the participation of women in policy-related decision-making;

j) **To support the implementation of global and regional environmental conventions** and legal instruments related to mercury and related ASM issues;

k) **To promote and support South-South cooperation** related to ASM development issues and mercury reduction;

l) **To provide assistance for developing and facilitating compliance with multilateral initiatives and guidelines** aimed at reducing mercury; and

m) **To recognize the relationship between poverty and environmental stewardship**, including the multiple ways in which socio-economic and environmental systems relate

3.5 Action Framework

As presented in Table 2, the action framework was created to provide a concise agenda for participatory discussion and engagement.

Table 2: Policy and Governance Initiative - Action Framework

1. International Guidelines on Mercury Management
Development of *UN International Guidelines on Mercury Management in Artisanal and Small-Scale Mining*
2. Capacity-Building and Institutional Strengthening
Strengthening of Multi-Sector Cooperation with Government Agencies and other Organizations in Support of Capacity-Building, Training, Technology, Education, and Mobilization of Resources to Facilitate and Assist in Fulfilling the Aims of the GMP
3. Policies on Mercury and Artisanal and Small-Scale Gold Mining
➢ **3.1) National Mercury Use**
› Assistance to Governments in the Development of Appropriate National Policy, Legislation and Regulation on Mercury Management in ASM
➢ **3.2) Compliance Strategy**
› Reinforcement of Government Capacity to Promote Compliance with Regulations in ASM Communities through Education, Monitoring and Enforcement Strategies
➢ **3.3) National Mercury Trade**
› Development of Knowledge and Tools for the Reinforcement of National Capacities to Monitor and Regulate the Domestic Trade and Distribution of Mercury Used in ASM
➢ **3.4) Transboundary Mercury Trade**
› Assessment and Recommendations on the Transboundary Trade of Mercury with a View of Reinforcing Capacities for Regulating the Export and Import of Mercury Used in ASM
➢ **3.5) National ASM Sector Policy**
› Development of Recommendations to Governments on Policy to Enhance Coordination, Pro-Poor Empowerment and Rights in the ASM Sector
➢ **3.6) Micro-Finance Initiative**
› Development of Pilot Programs Enabling ASM Communities to Access Credit and Finances to Support Technology Transfer
➢ **3.7) Fair Trade Gold**
› Development of Global Certification Criteria and Equitable Market Policies and Processes for Fair Trade ASM Gold
4. Global Partnerships for Development
Strengthening and Expansion of Global Partnerships for Development - Joint Activities, Regional Network Capacity-Building, Global Awareness and Resource Mobilization

3.6 Main Issues Considered

Activities	Main Issues Considered
1. Development of *U.N. International Guidelines on Mercury Management in Artisanal and Small-Scale Mining*	▪ Guidelines aimed at minimizing mercury use in ASM and reducing environmental and occupational hazards ▪ Technical guidelines on mercury use; emission controls; recycling; and tailings management; exposure controls; location of use; storage; and disposal ▪ Specific guidelines on the protection of water bodies ▪ Guidelines on clean-up and rehabilitation ▪ Recommendations for licensing mercury distribution and use ▪ Recommendations for instituting mercury regulations in mining to phase out mercury use over short and long term ▪ Recommendations on accountability and liability issues concerning mercury management practices (with specific consideration of the role of miners, millers, etc) ▪ Recommendations on accountability and liability issues concerning public and occupational exposure and environmental contamination ▪ Recommendations for developing community-based as well as national monitoring and enforcement
2. Strengthening of Multi-Sector Cooperation with Government Agencies and other Organizations in Support of Capacity-Building, Science, Technology, Training, Awareness and Mobilization of Resources to Facilitate and Assist in Fulfilling the Aims of the Global Mercury Project	▪ Promotion of effective sustainable partnerships with major stakeholders and opportunities for joint for environmentally sound management activities emphasizing mercury minimization and the strengthening of capacity building ▪ Cooperation and partnership at all levels between public authorities, international organizations, the industry sector, NGOs and academic institutions ▪ Participation in the implementation of GMP Education and Awareness Campaigns and Technology Demonstration Units in project sites; and joint activities in other ASM regions ▪ Enhancement of information exchange, education and awareness-raising in all sectors of society ▪ Identification of priority sites for future capacity-building ▪ Development of national inventories of technology capabilities, production centers and support mechanisms

3.1 Assistance to Governments in the Development of Appropriate Policy, Legislation and Regulation on Mercury Management in ASM	▪ Classification level for mercury as a hazardous substance ▪ Legal base for instituting mercury regulations in mining ▪ Licensing of mercury amalgamation and distribution ▪ Technical recommendations on mercury use; emission controls; recycling; and tailings management ▪ Establishment of technical recommendations for exposure ▪ controls; location of use; storage; and disposal ▪ Protection of water bodies from mercury and mining ▪ Accountability and liability issues concerning mercury management practices (with specific consideration of the role of miners, millers, etc) ▪ Accountability and liability issues concerning public and occupational exposure and environmental contamination ▪ Recommendations on clean-up and rehabilitation ▪ Community-based monitoring and enforcement ▪ Clear accountability for miners, mine/land owners, etc
3.2 Reinforcement of Government Capacity to Promote Compliance with Regulations in ASM Communities through Education, Monitoring and Enforcement Strategies	▪ National awareness of laws and associated requirements ▪ National awareness of mercury hazards ▪ National awareness of benefits of compliance through the use of environmentally sound and efficient technologies ▪ Integration of regulatory issues in GMP Education and Awareness Campaigns and Technology Demonstration Units ▪ National training of officers and enforcement agents ▪ National/local level strategies for monitoring/enforcing ▪ Identification of priority sites for monitoring and reclamation
3.3 Development of Knowledge and Tools for the Reinforcement of National Capacities to Track, Monitor and Regulate the Domestic Trade and Distribution of Mercury Used in ASM	▪ Development of national inventories on quantities of mercury used in ASM, primary international sources, quantities imported, prices, domestic channels, primary dealers, other purposes of mercury, and marketing mechanisms to, and within, the ASM sector ▪ Tools to support sustainable monitoring of the import, sale distribution, and use of mercury ▪ Reinforcement of national capacities to detect and

	halt illegal traffic in mercury and stockpiling of mercury ▪ Development and implementation of legislation and institutional frameworks, including a legal base for regulating mercury trade and conduct of inventories, e.g. hazardous substance audits, disposal and phase- out plans, etc ▪ Assessment of legality of particular trade practices, such as setting standards for market mercury prices; limiting free mercury dealing by gold purchasers ▪ Licensing traders; etc
3.4 Assessment and Recommendations on the Transboundary Trade of Mercury with a View of Reinforcing Government Capacities for Regulating the Export and Import of Mercury Used in ASM	▪ Analysis of data submitted by Activity 3.3 to prepare national plans to reduce transboundary trade of mercury to a minimum ▪ Review of national waste management infrastructure and systems in the context of transboundary trade by national authorities and tools to measure effectiveness ▪ Development of national regulation and institutional policy to restrict imports of mercury ▪ Assessment of regional and global patterns of transboundary trades of mercury with a view to improving coordination among Governments in developing standards or common approaches to reduce export and import ▪ Promotion of awareness about mercury in ASM as a means of encouraging industrial countries to ban or restrict the export of mercury to developing countries
3.5 Development of Recommendations to Governments on Policy to Enhance Organization, Coordination and Pro-Poor Empowerment and Rights in the ASM Sector (continued)	▪ Legal recognition of ASM ▪ Incorporation of a poverty reduction dimension in ▪ mining policy, recognizing both the constraints and the potential of ASM as an economic sector ▪ Formalization of ASM activity with incentives for registration ▪ Simplification of registration and licensing procedures ▪ National programs for technology assistance and training ▪ Regulatory frameworks on environmental management, health and safety; and associated codes of practice ▪ Implementation of standards from the ILO Convention on ▪ Health and Safety in Mines and other relevant standards ▪ Mining titles and designated areas for ASM ▪ Incentives to discourage illegal mining and illegal

	trading ▪ Access to formal markets and marketing mechanisms ▪ Policies on women and gender in ASM ▪ Children's issues in the ASM sector ▪ Institutional functions, capacity, coordination amongst ▪ Government agencies ▪ Local participation in policymaking, with representation of vulnerable groups in decision-making processes ▪ Resource mobilization to support local delivery functions
3.6 Development of Pilot Programs Enabling ASMs to Access Credit and Finances to Support Technology Transfer	▪ Identification and assessment of viable micro-economic development / poverty alleviation models to assist the ASM sector to transfer to cleaner technologies - e.g. village banking, loan-based and equity-based financing schemes, hire-purchase schemes; donor and government support programs; finances through cooperation of ASM miners and mining companies ▪ Implementation of pilot micro-credit programs in GMP project sites, integrated with GMP Education and Awareness ▪ Campaigns and Technology Demonstration Units ▪ Development of sustainable long-term community-based financing mechanisms for ASM in GMP sites and nationally ▪ Development of core organizational and trust building activities and training in GMP project sites, following from assessments and consultations with communities, to build capacity for collective transfer to improved technology ▪ Capacity building for cooperatives, guilds, associations, etc. ▪ Development of basic business principles awareness and training for community-based organizational development, incl. issues of shared ownership of equipment, production strategies, cooperative mining, economic behaviors
3.7 Establishment of Certification Criteria and Processes for Fair Trade Gold in ASM	▪ Development of environmental, social, and economic criteria for Fair Trade gold, including mercury-related criteria ▪ Development of organizational capacity in mining communities for meeting progressive Fair Trade Criteria ▪ Development of niche markets for Fair Trade gold by building on previous experience with fair trade markets and establishing supply chain networks

	which deliver gold from small-scale producers more directly to refineries and linkages between ASM producers to international markets. ▪ Communication and promotion of the initiative's findings and program of action, including the identification of models of certification and an international certifying agency
4. Strengthening and Expansion of Global Partnerships for Development - Joint Activities, Regional Network Capacity-Building, Global Awareness and Resource Mobilization	▪ Consolidation of strategic partnerships to support regional and global action plans with major stakeholders and opportunities for environmentally sound management activities emphasizing mercury minimization and the strengthening of capacity-building and technology transfer in ASM and related developmental issues ▪ Development of joint activities with other initiatives of UNIDO, UNDP, GEF, UNEP and other international agencies; public authorities; international organizations; the industry sector; mining companies, NGOs; and academic institutions, identifying opportunities and synergies ▪ Identification of opportunities and implementation of programs that replicate GMP capacity-building in other countries (e.g. Mozambique, etc); formation of partnerships with other organizations and developing knowledge on mercury, ASM infrastructures and future needs and priorities ▪ Dissemination of the produced GMP results and identification of opportunities that will allow the project to continue beyond 2007 through self-financing, including conducting donor conferences to solicit financing and workshops with potential contributors ▪ Enhancement of awareness of mercury and ASM issues on a global scale through public media and media for donors

CHAPTER 4: ANALYSIS OF INITIATIVES AND RESULTS

4.1 Activity 1: International Guidelines on Mercury Management

4.1.1 Overview

As emphasized at the start of this thesis, in more than 50 developing countries, an estimated 10-20 million people are directly involved in artisanal and small scale gold mining (ASM). This activity usually involves the use of substantial amounts of mercury in mineral processing, often in highly unsafe and environmentally hazardous conditions. Veiga and Baker (2004) estimated that as many as 100 million people may be exposed to mercury emitted from ASM. Mercury misuse in ASM is responsible for an estimated 1000 tonnes of mercury polluted annually into the environment, with negative impacts in diverse ecosystems including international waters" (UNIDO, 2007a).

It should be emphasized that while local conditions vary, many of the hazards are similar, including extensive emissions in tailings, contamination of water bodies, vapor inhalation (Veiga and Baker, 2004; Swain et al, 2007; Spiegel and Veiga, 2005; Hinton, 2006). However, environmental regulations are minimally developed for ASM in most countries, or not yet developed, and consequently, mercury is generally unaddressed. In the absence of an international management code for mercury management in ASM, many governments have been unsure how to address policy in ASM, what hazards are most pressing, and what technical practices should be regulated.

This study's research process, early on its formation, began to engage specialized experts from various countries and disciplines - mining engineers, metallurgists, environmental scientists, toxicologists, and legal and policy experts - to prepare and propose the draft *U.N. International Guidelines on Mercury Management in Artisanal and Small-Scale Gold Mining.* These guidelines provide standards of operation and regulatory guidance for governments. They are designed to promote the minimization of mercury use as well as the elimination of pollution point sources and occupational health risks in mercury management. The guidelines also assist in addressing multi-actor

responsibility issues in the ASM setting and include guidance on adoption into national legal systems.

4.1.2 Discussion of Goals

Develop U.N. International Guidelines on Mercury Management in ASM to assist governments in minimizing mercury use in ASM and reducing environmental and occupational hazards. The goals address, but are not limited to, the following issues:

- Emission controls to eliminate pollution point sources
- Use of retorts to reduce mercury vapor exposure
- Recycling and reusing mercury
- Reduction of mercury in tailings
- Tailings management methods
- Prevention of amalgamation of the whole ore using copper plates or adding mercury into mills or adding mercury into sluice boxes or any other concentration equipment

Fig. 3: Mining Alluvial Gold Ore in Central Kalimantan, Indonesia

Fig. 4: Cyanide Tanks in Zimbabwe

- Prevention of combined use of mercury and cyanide, and mercury and acid
- Restriction of location of mercury use; protection of village/residential areas and protection of water bodies
- Exposure controls and ventilation facilities
- Protection of pregnant women and children
- Storage and disposal methods
- Clean-up and rehabilitation
- Guidelines for minimizing mass-flows of overburden and/or sand/gravel and sedimentation
- Guidelines for mercury management in gold shops
- Recommendations for licensing mercury sale, distribution and use in mining
- Recommendations on accountability and liability issues concerning mercury management practices in mines, with specific consideration of the role of miners, mine owners, millers, etc
- Recommendations on accountability and liability issues concerning public and occupational exposure

- Recommendations on accountability and liability issues concerning environmental contamination
- Recommendations for community-based as well as national monitoring and enforcement
- Government implementation procedures and guidelines
- Accompanying "model legislation", including main provisions for implementation

4.1.3 Initiatives

The following initiatives were completed:

A) A review and analysis of laws, regulations, guidelines, and codes of practice available internationally (including GMP countries and others), that address mercury management in ASM and related practices in ASM such as protection of waters, tailings management, occupational risks, etc

B) A review of reports and scientific literature available internationally, including GMP Environmental, Health, Socio-economic, Sociological, and Legal Assessments, to collect relevant technical and strategic insights into the development of the International Guidelines on Mercury Management in ASM

C) A synthesis of above information to develop technical and strategic measures for inclusion in the International Guidelines on Mercury Management in ASM.

D) Conducting of targeted stakeholder consultation processes with miners, Governments, and other groups, to discuss and gain insights regarding additional important measures for inclusion in the International Guidelines on Mercury Management in ASM; and

E) Preparation of main standards and technical language for incorporation in Draft International Guidelines on Mercury Management in ASM

The following are recommended initiatives for future planning:

F) Finalization of first draft, revision and circulation of Draft U.N. International Guidelines on Mercury Management in ASM for comments, amongst GMP Team Members

G) Revision and circulation of Draft U.N. International Guidelines on Mercury Management in ASM for comments, amongst government representatives in different countries and wider communities of researchers, policymakers and stakeholders

H) Preparation and execution of plans for the publication and official inauguration of the U.N. International Guidelines on Mercury Management in ASM; and

Preparation and execution of strategies to promote the adoption of the U.N. International Guidelines on Mercury Management in ASM by Governments in countries where ASM is prevalent, globally

4.1.4 Debating the 'Indicators of Success'

The U.N. International Guidelines were not initially part of the mandate of the GMP. However, they were drafted following the realization that multiple governments and aid agencies were trying to re-invent the wheel at once. Thus, the indicators of success became clear: a successful initiative would yield clear, appropriate and useful guidelines on specific practices in such ways that draw consensus among government representatives and stakeholders. Yet, a number of political and technological concerns emerged through discussion as highlighted below.

While the importance of the above, however, whether or not a "success" occurs because national governments adopt new legislation should be carefully re-examined. According to GEF guidelines, projects are evaluated positively if they trigger a legal change. Yet there is an overall tendency to spend time and resources on adding bureaucratic regulatory instruments without careful attention to context, as James Ferguson's famous criticism suggests earlier in his idea the UN is an "anti-politics" machine. Thus, development agencies need to be open to the possibilities of careful monitoring and adapting the implementation of such guidelines; this may very well mean using the guidelines for engaging not merely national governments but also/instead traditional

leaders and local grassroots workers to better understand how such guidelines would – or might not – comport with local expectations of what is appropriate. The international guidelines can lead to multiple "successes" by the very processes of identifying to whom the guidelines should be oriented and for what purposes. These very processes of discussing responsibility for technology assistance, if sensitively undertaken, are arguably much more important than the technicalities of the guidelines themselves.

Regarding the technicalities of the technology standards, the guidelines require further discussion. Researchers like Hylander (2001) and Vieira (2006) suggest that mercury-free technologies should be the priority and thus the guidelines, they might suggest, should be more focuses on complete mercury-phase out. The UNIDO report to the UNEP Governing Council Session, circulated to governments worldwide at the UNEP Governing Council Session in Nairobi, Kenya, noted that, "In approximately 10% of current ASM cases, gold sources are alluvial ore (free gold) and completely mercury-free-alternatives could be locally available at a very low cost" (UNIDO, p. 2). In the other 90% of cases, it was deemed that a mercury reduction strategy, rather than a mercury elimination strategy, would be a more effective means of proceeding under the current constraints that poorer nations are facing in mining sectors. The guidelines that are suggested (below) could be accompanied with another set of guidelines – which has yet to be written – on how governments can support the phasing out of mercury entirely, wherever that may be possible. Nonetheless, readers of the guidelines below should appreciate that they are intended to be "minimum requirements" – mainly intended to eliminate the most severe and preventable hazards, even where mercury is used.

The guidelines themselves do leave much to the imagination. What should miners do with recycled mercury? What should miners do with tailings that are mercury-contaminated? Should such tailings be buried, as the guidelines suggest (or reprocessed to extract more gold)? In Indonesia, after much debate about this issue, these draft guidelines were implemented into a new policy. Yet, the idea that tailings should be buried safely – as described in the guidelines below - might possibly come into conflict with UNEP waste management guidelines, which have separate guidelines

for waste disposal.[3] Miners are already – under existing international agreements (notably the Basel Convention) – facing more restrictions with respect to the mercury in their tailings (which they often have no use for) than the mercury they use and wish to re-use. If the UN continues to facilitate discussion on international guidelines, a priority may be to revisit the multiple inconsistencies of different guidelines and international agreements. There are many inconsistencies with existing mercury policies: for instance, companies in North America with large mercury stocks can export thousands of tonnes of high-grade elemental mercury, but cannot transfer equipment to miners in developing countries if it contains even trace amounts of lower-grade mercury. Teck Cominko, for example, was willing to donate its old equipment to ASM but is required to bury all the equipment from its mine at Pinchi Lake, British Columbia, because it contains grams of mercury, even though the company has in the past exported 4000 tonnes of mercury (Veiga, Personal Communication).

While both the political and technical dimensions can be debated further, the next page provides the set of suggested guidelines, as currently be circulated among UN experts and advisors for further inputs:

4.1.5 Principal Technical Measures of International Guidelines

SCOPE

These guidelines provide minimum threshold standards that significantly reduce mercury emission and exposure where properly implemented. However, in all cases possible, miners should be encouraged to adopt appropriate mercury-free mineral processing methods. Various technical and environmental aspects of mercury management in ASM are addressed in these guidelines. The central aims of these guidelines are to assist governments in the development of legislation and/or regulation to accomplish the following goals:

(1) reduce ASM-related mercury emissions into the environment;

(2) reduce occupational and second-hand exposures to mercury;

[3] Mercury Waste and Basel Convention: A Note by the UNEP Secretariat, November 2006 http://www.basel.int/meetings/cop/cop8/docs/i37e.pdf

(3) eliminate the major inefficient and unsafe practices of mercury use; and
(4) reduce unsafe storage and disposal of mercury
(5) provided minimum standards which can lead to the future elimination of mercury use in ASM operations

IMPLEMENTATION

Governments should identify the appropriate authority responsible for implementation of these guidelines, and make any appropriate modifications to the technical measures to include in developing new mercury laws, policies or regulations. It is recommended that such policies be adopted under the clear jurisdiction of authorities that are responsible for small-scale mining issues, in consultation with other relevant authorities, recognizing that such authorities may be best suited to conduct monitoring. Strong emphasis should be placed on encouraging local-level governance and community-based monitoring systems. Community stakeholder participation in the processes of policy development and field implementation are critically important. Governments should provide ways to legalize the artisanal and small-scale miners as well as to educate them on environmental management. Technological assistance and capacity/education services should be provided in all areas where there is a high concentration of small-scale miners.

PRINCIPAL TECHNICAL MEASURES

1. RESPONSIBILITY OF EMPLOYERS OF MINING/PROCESSING PLANTS/GOLDSHOPS OPERATION

These guidelines apply to all legal operations where mercury is used to amalgamate gold, amalgam is being burned or retorted, and gold is being melted. In all cases, the primary mining/ore processing license holder and gold shop owners should be held legally responsible for safe mercury-related practices. The mining license holder or gold shop owner should institute reasonable safety measures to prevent the exposure of employees or other persons to mercury fumes.

2. LICENSE TO WORK WITH MERCURY

All licensed operations where mercury is used or handled should obtain a special license specifically for mercury at its facility.

3. MERCURY AMALGAM BURNING

No person should heat/burn mercury amalgam to recover the gold without using a retort, which must be used to contain/condense the mercury vapour releases. Retorts should be used to recycle mercury (in the form of a bowl retort, pipe retort, hood, etc). Knowing that retorts are not 100% efficient, no person should retort gold in residential area. This must be done distant (say MORE THAN 500m) from any house. No children and pregnant women must be present in the retorting activities.

4. NO WHOLE ORE MERCURY AMALGAMATION

No person should amalgamate the entire ore, through the use of a mercury-copper plate or putting mercury into any gravity concentrator, centrifuge, or ball mill. This causes mercury flouring and a large portion of mercury is lost to the environment with tailings. Amalgamation must be used ONLY for gravity concentrates.

5. AMALGAM BARREL

Amalgamation of concentrates must NOT be conducted manually. This must be conducted for 30 to 40 minutes in small plastic or steel rotating barrels with rubber balls or a chain inside to increase the homogenization of the mixture of concentrate and mercury. The amount of mercury added into the barrels must be controlled (less than 1 part of Hg to 60 parts of concentrates) No cyanide or potassium permanganate or any other oxidizing agent must be allowed to be added to the barrel; only a dash of detergent is enough to clean gold particle surfaces. An amalgam separator such as an elutriator must be promoted to separate amalgam from heavy minerals after amalgamation.

6. CENTRALIZED AMALGAMATION SITES

Amalgamation and retorting should only be conducted in designated sites (amalgamation pools and isolated retorting places) distant at least 500 m from any

inhabited place. For any mining location where amalgamation occurs, the primary license holder or mine manager shall designate a portion of the mining location as the prescribed structure, facility or locale where amalgamation may take place. Amalgamation may only take place in such structure, facility or locale. The holder of an ASM license shall ensure that washing or settling ponds are constructed in his or her license area to provide for washing and sluicing, and no such washing and sluicing shall be done along or close to rivers, streams or any other water sources.

7. PROTECTION OF WATER BODIES

No person should conduct amalgamation or separation of amalgam from concentrates or burning amalgam or retorting in any natural water body or within a distance of 100 metres from any natural water body, including rivers, streams, lakes, and other water bodies.

8. PROTECTION OF RESIDENTIAL AREAS

No person should use mercury for amalgamation or any other purposes in residential areas or within a distance of 100 metres from any residential areas, including villages, towns, cities, or settlement areas.

9. NO MERCURY-CYANIDE INTERACTION

No person should use mercury in conjunction with cyanide, or conduct cyanidation of mercury-rich tailings.

10. DISPOSAL OF MERCURY OR MERCURY-CONTAMINATED TAILINGS

Any disposal of mercury-contaminated tailings should be done in a safe and proper way. No person should discharge mercury-contaminated tailings into a water body or in places susceptible to flooding. Disposal of mercury-contaminated tailings must be done by placing it on a clay or laterite soil-lined pit of 5 metres depth, located 100 metres away from any water body. When the hole is filled with mercury-contaminated tailings, this must be covered with 1 meter of clay or laterite, then compacted, covered with soil, and revegetated.

11. EXTRACTING RESIDUAL GOLD FROM MERCURY-CONTAMINATED TAILINGS

Mercury-contaminated tailings must not be recycled to the concentration circuit once this contaminates the primary tailings. If any process is to be applied to recover residual gold from mercury-contaminated tailings such as leaching with cyanide, thiourea, etc., the residual mercury must be removed (e.g. by gravity concentration) prior to leaching. The effluents and tailings from gold extraction must still be treated as mercury-contaminated tailings and must be buried.

12. CONDENSERS FOR GOLD SHOPS

Any shop buying retorted gold, or any shop that is retorting gold, must have a proper fumehood installed to capture, condense and recycle mercury. The design of the fumehood should be such that over 90% of the mercury is captured.

13. STORAGE OF MERCURY

Metallic mercury should be stored safely at all times when not used; in (a) a secure location that is inaccessible to children; and (b) unbreakable air-tight containers that are covered with a thin layer of water (e.g. 1 centimetre) to prevent mercury evaporation.

14. PROTECTION OF PREGNANT WOMEN AND CHILDREN

People who perform amalgamation, retorting, melting gold or handling mercury must ensure that no pregnant women, or children under the age of sixteen, enter the structure, facility or locale in which mercury is being used.

15. PRIOR DEMONSTRATION OF MERCURY AWARENESS

When miners apply for mining licenses and before beginning operations, they should demonstrate awareness of how to comply with these guidelines.

16. MERCURY-FREE METHODS

The above guidelines demonstrate minimum *threshold requirements.* These measures significantly reduce mercury emission and exposure where properly implemented. However, in all cases possible, miners should be encouraged to adopt appropriate mercury-free mineral processing methods.

4.2 Activity 2: Capacity Building and Institutional Strengthening

Strengthening of Multi-Sector Cooperation with Government Agencies and other Organizations in Support of Capacity-Building, Science, Technology, Training, Awareness and Mobilization of Resources to Assist Rural Mine Workers

4.2.1 Overview

Over the past few decades, researchers have increasingly emphasized the need for environmental considerations to play a central part of planning and decision making in low income countries (e.g. Counsell and Bruff, 2001; Roberts and Colwell, 2001; Dalal-Clayton, Sadler, 2005). Risks posed by global environmental change are becoming more and more imminent, and with this has emerged greater understanding of the extent to which livelihoods are interwoven with a reliance on natural resources at variant geographical levels, from the 'local' to the 'global.' Developing strategic environmental policy frameworks has been recognized as a crucial means to safeguard ecological resources and ensure sustained economic development. Consequently, environmental sustainability is now firmly located on the international development agenda, expressed in the suite of climate change, biodiversity and desertification treaties adopted at the Rio Earth Summit in 1992, the Johannesburg Plan of Implementation, and the Millennium Development Goals.

At the same time, while popular concepts such as sustainable development and sustainability seek an integration of environment and development concerns through "integrated development planning" – to use the World Bank's language (Hinton, 2006) - or "inter-sector management" to use another favorite term, in many regions of the world there is often little evidence that this integration is occurring in either mainstream development planning or environmental planning. Ogunseitan (2003) emphasizes how, in much of Africa, the "reconciliation of national development plans with global priority to mitigate environmental change remains an intractable policy controversy." In the apparent absence of environmental governance, short international environmental "policy interventions" have, perhaps unsurprisingly, become increasingly common.

The GMP realized early on that the "policy" component of the project needed to go beyond a shallow advocacy of merely affecting philosophical policy articulations *on paper*, to fundamentally attempt to address how policy changes would also address *governance* – the ways institutions actually worked. Just as legal and regulatory aspects play a key role in strengthening environmental governance in the ASM sector, policy development to address institutional governance strategies is fundamental. Strengthening cooperation amongst various government agencies is essential for success. Additionally, capacity-building must occur at all levels. Building local, regional and national capacity for the science and technology of improved mining techniques is essential, as is the mobilization of resources to ensure the uptake of the improved technology. This is not only important to ensure that regulatory standards can be met, but also to ensure that mining activities can evolve in sustainable ways and contribute positively to the economic development of the sector.

While attempting to encourage a culture of governance that prioritizes field assistance, the GMP team has been working with governments to build capacities at the local level and that enhance collaboration with different institutions. A critical policy objective of the GMP is to ensure that countries can build institutional functions that ensure the sustainability of capacity-building measures as demonstrated by the Awareness Campaigns and TDUs and that government personnel are themselves trained.

4.2.2 Discussion of Goals

GMP goals are to build on the specific local strengths to address the following:

- Promotion of effective sustainable partnerships with major stakeholders and opportunities for joint environmentally sound management activities emphasizing mercury minimization and the strengthening of capacity building
- Cooperation and partnership at all levels between public authorities, international organizations, the industry sector, NGOs and academic institutions
- Participation in the implementation of GMP Education and Awareness Campaigns and Technology Demonstration Units in project sites; joint activities in other ASM regions; establishment of education centers for ASM located in critical ASM regions

- Enhancement of information exchange, education and awareness-raising in all sectors of society
- Identification of priority sites for future capacity-building
- Development of national inventories of technology capabilities, production centers and support mechanisms

4.2.3 Debating the 'Indicators of Success'

Details are available in reports on the GMP Education and Awareness Campaigns and Technology Demonstration Units. In keeping with the above policy objectives, these initiatives have included the involvement of various public authorities in addition to NGOs, academic institutions, and other stakeholder institutions. Through various qualitative questionnaires, different perspectives of success emerged. Some suggested that "success" should be measured if a certain quantity of mercury was stopped from being polluted in the environment. Others suggested "success" was suggested if local and national governmental and non-governmental organizations are "effectively engaged in technology transfer" in ways that create a climate where "strong relationships are built" for future mercury-reduction in the coming months. Some stakeholders suggested that governance success emerges if authorities from certain ministries make sure that human and financial resources are mobilized to promote technology transfer

An important success indicator, although less tangible perhaps, should also be that miners feel they can trust government officers more, as successful education depends in large degree on the ability to form trustful relations; Scoble (2006) has suggested that *trust* is among the most important factors in building sustainable changes in ASM communities, and certainly trust can be interpreted at multiple geographical levels – in ASM communities, between national institutions, between national and international agencies, and so forth. The GEF indicators of success are discussed more in other summary documents (Chouinard, 2007), giving focus to how government workers participated in training activities. Independent GEF evaluations are currently being conducted as well.

4.2.4 Cast Study: Environmental Capacities of Institutions in Laos

In Laos, the implementation of GMP capacity-building activities was planned to take place within the eight villages of the Nam Ou and Mekong rivers – an ambitious geographical focus for interventions. These rivers were the subjects of the environmental and health assessments. Implementation kicked off in 2006, with stakeholder workshops in Vientiane and Luang Prabang, while many stakeholders noted that this was considerably after the expected timeline for a project that was supposed to finish in 2006. However, making up for lost time, the Vientianne workshops sought to target a diversity of government ministries and departments, including the Department of Geology and Mines, Ministry of Health, and Ministry of Science, Technology and Enviornment. The Luang Prabang workshop was dedicated to training local officials, especially village heads, the Women's Union and Youth Front, and a subcontractor who will carry out the TDU and Awareness Campaign activities. Other potential partners in GMP implementation could include the World Bank, World Wildlife Fund, Earth System Laos, and Ecalao. Field implementation followed the stakeholder workshops, focusing on introducing simple manual sluice boxes, a variety of carpets, and retorts. Although military personnel were said to have taken over some of the mining sites and displaced ASM workers, Baker et al (2007) has provided a systematic analysis of the contexts of the training and lessons learned; he notably mentions how some training was successful in conveying key concepts – and how attention to political constraints is needed in future.

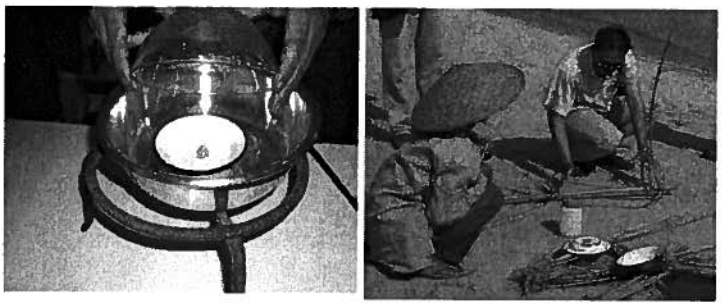

Fig. 5: Lao Government Representative Demonstrating Retorts

4.2.5 Case Study: Engaging Sudanese Authorities for Capacity-Building

A GMP educational campaign was implemented in Sudan to teach local trainers, including the Geological Research Authority of Sudan (GRAS), local media professionals, and nurses on issues of mercury poisoning, behavior change education strategies and family health. The actions started in the village of Gugub, where trainers were taught by GMP experts how to deliver awareness campaigns to miners; trainers demonstrated sluicing, and panning technologies to miners.

Fig. 6: Sudanese Nurse with the Head of Gugub Village

The campaign received significant attention from local television when Blue Nile State television produced a 45 minute documentary of the events. The report featured interviews with community leaders, and was broadcast across the state in the week following the campaign. To create a public presence in the villages, educational materials about the use of mercury were translated to Arabic and distributed to miners as teaching aids. The result of the 2004 health and environmental studies were delivered to the communities. Participants were provided health counseling based on their age and how much mercury they were exposed to. Approximately 110,000 miners in the Blue Nile region are currently working by the river. The GMP has increased awareness of sustainable practices by promoting an understanding of ecosystem factors of health, and by building the capacity to embrace technological solutions that increase productivity and protect the environment. With support from local government leaders as well as national officials, the campaign is anticipated to grow to surrounding regions where mining activities are proliferating, and has been further documented by Davis (2007). The GMP hopes that the government commits budget resources to continue the TDU training in the near future.

4.2.6 Case Study: Working with Brazilian Leaders to Improve Education

In Brazil, a variety of institutions have collaborated on ASM training: the Center for Mineral Technology, the Ministry of Health were the Association of the Gold Miners of Tapajos (AMOT), as well as the Mayor of the municipality of Itaituba, and representatives from the municipal departments of Mining and Environment, and Health. After a variety of administrative changes, the awareness campaign kicked off in 2006. Sousa and Veiga (2008) have further studied these processes and suggest that a key lesson is how the local governments rather than the national government (contrary to initial GMP project structure) should be made the focus for training and policy issues.

The Tapajos River basin in the Brazilian Amazon was in the 90s the largest concentration of artisanal and small-scale miners in the world with more than one million people. Nowadays, with 40,000 miners, about 8 tonnes/a of gold are produced and at least the double of this amount of mercury is released into the environment. This region was selected for the implementation of the Global Mercury Project (GMP), a United Nations program aiming at the reduction of environmental and health impacts caused by mercury through the introduction of cleaner technologies and implementation of awareness campaigns. A group of 13 individuals, trained to teach miners tools that can lead to behavior change, taught 4,200 miners in 141 different mining locations. The effectiveness of this training was evaluated on 20 performance indicators. After 120 days of training almost 50% of the mining sites incorporated the practices taught by the GMP trainers with absolute improvement of approximately 29%. As a result of the training it has been estimated that annual mercury losses in the Tapajos have been reduced by 1,762 kg or around 10% of the total mercury released in the region (Sousa and Veiga, 2008).

4.3.1 Activity 3.1: Regulation of Mercury Use

Legislation and Regulation on Mercury Management Assistance to Governments in the Development of Policy, Law and Regulation on Mercury Use in ASM

4.3.1.1 Overview

As ASM continues to expand globally, governments are increasingly recognizing the need to institute new policies to strengthen the management of environmental, health, social, economic and legal aspects of this sector. However, as ASM is an informal sector and its associated legislative frameworks are minimally developed in most countries, mercury controls remain largely unaddressed in law and policy. Globally, most countries, even those with substantial ASM sectors, have not yet established legislation and regulation for environmental management aspects of ASM.

Lack of knowledge on mercury issues has been identified as a significant barrier. While the GMP is preparing the U.N. International Guidelines (Activity 1), the GMP policy experts are also working directly with the governments of the GMP countries to develop and/or strengthen national legislation, regulation and policy measures to address mercury in ASM.

4.3.1.2 Discussion of Goals

Based on the specific country conditions, and legislative and regulatory frameworks that exist in each of the participating countries and their respective jurisdictions, the GMP is assisting governments in developing policy to minimize mercury use in ASM and reduce environmental and occupational hazards. Depending on local conditions and specific needs, legislative and/or regulatory provisions may address issues such as:

- Mercury management practices and emission controls to eliminate point sources of pollution
- Use of retorts
- Recycling and reusing mercury
- Reduction of mercury in tailings

- Tailings management methods
- Prevention of mercury/cyanide interaction
- Restriction of location of mercury use, with emphasis on protection of village/residential areas and protection of water bodies
- Exposure controls and ventilation facilities
- Protection of pregnant women and children
- Storage and disposal methods
- Clean-up and rehabilitation
- Licensing mercury sale, distribution and use in mining
- Mercury management in gold shops
- Accountability and liability issues concerning mercury management practices in ASM (with specific consideration of the role of miners, mine owners, millers, etc)
- Accountability and liability issues concerning public and occupational exposure
- Accountability and liability issues concerning environmental contamination
- Community-based as well as national monitoring and enforcement
- Government implementation procedures and guidelines
- Other specific legislation and regulatory provisions as appropriate to the local conditions.

Fig. 7: Using Mercury in a Water Body in Indonesia

4.3.1.3 Initiatives

The following initiatives were completed in some cases, and are currently in-progress in other cases:

A) Review of legal classification level for mercury as a hazardous substance

B) Verification of existing laws concerning mercury management and the management of other toxic substances
C) Verification of recommended development of a legal base for instituting mercury-specific regulation in mining
D) Development of recommendations and draft measures on policy/regulatory mechanisms for licensing of mercury amalgamation and distribution
E) Development of technical recommendations and draft measures on mercury use; emission controls; recycling; and tailings management
F) Development of technical recommendations and draft measures for exposure controls; location of use; storage; and disposal
G) Development of specific provisions and draft measures for the protection of water bodies from mercury and/or mining
H) Investigation of possibilities for developing policy mechanisms on accountability and liability concerning mercury management practices (with specific consideration of the role of miners, millers, etc)
I) Investigation of possibilities for developing standards for accountability and liability concerning public and occupational exposure, and environmental contamination
J) Investigation and development of recommendations on clean-up and rehabilitation
K) Investigation and development of mechanisms for community-based monitoring and enforcement; and
L) Formulation of recommendations for clear accountability for miners, mine/land owners, millers, etc.

4.3.1.4 Priorities

In addition to completing country-specific work currently underway regarding the above initiatives (see case study boxes below), overall policy initiatives planned include focusing on the following prioritized objectives:

General Use of Mercury

a. Restrict mercury-amalgamation to locations designated for mining, performed only by miners with amalgamation licenses
b. Eliminate mercury amalgamation without the use of a retort to contain vapor
c. Eliminate the practice of whole ore mercury-amalgamation on copper plates.

Location of Mercury Use

d. Eliminate the use of mercury within 100 meters of public streams and water bodies
e. Eliminate the use of mercury within 100 meters of houses
f. Institute the requirement that mining managers, where applicable, establish designated areas for retorting and that no amalgamation shall occur outside this area

Storage and Disposal of Mercury

g. Institute the requirement for mercury to be stored in air-tight containers that are kept under a layer of water when not used
h. Eliminate the placement of mercury into solid disposal systems or wastewater disposal systems

Additional Exposure Controls

i. Institute the requirement that mine managers, where applicable, ensure that no pregnant women or children under the age of sixteen years enter the structure, facility or locale in which amalgamation is carried out
j. Require that safety gloves be worn when handling mercury

Require the licensing of Mercury

k. Require licensing for the sale and distribution of mercury
l. Institute licensing requirement for the purchase of mercury
m. Institute specific licensing requirements for mercury-amalgamation in ASM

Establish mechanisms for government enforcement and monitoring

n. Clearly identify relevant government enforcement officials

o. Establish specific and appropriate penalties for violations

Institute mechanisms for community-based enforcement and monitoring

p. Stipulate that responsibility of compliance falls upon miners as well as mine managers and/or owners of operations where applicable; and
q. Stipulate that mine managers, where applicable, keep records of all mercury brought onto the mining location, date acquired, and amount

4.3.1.5 Debating the "Indicators of Success"

Governments in the various partner countries actively participated in GMP policy discussions and various governments adopted new measures, as profiled in the case studies below. It suffices to say, adding more regulations at the national government level can – but also might not – lead to desired results. Is adding a new mercury policy necessarily a positive development? Is this necessarily the most effective and appropriate way to regulate risks? To summarize the lessons learned from the case studies below, in Zimbabwe, the focus on millers – not miners – needs to be a prerequisite for mercury reduction policies. In Indonesia, a key lesson was that the local government is the more appropriate agent with which to design policies related to the gold mining and extraction sector – not the national government; it was also learned that urban gold shops can – and have – seen remarkable reductions in mercury pollution due to concentrated initiatives to address policy in conjunction with education campaigns. In Laos, a key new development is a mercury code at the national level, but this policy is arguably meaningless – or limited in its ability to assist miners – unless other policies are reformed to allow ASMs to attain the status of "semi-mechanized" legally. In Tanzania, a key lesson has been that the government decided to adopt a mercury code, rather than amend the regulatory system; it remains to be seen whether this new mercury code will come to impact land-owners' responsibility as well as individual miners. If land-owners are held responsible for mercury use on their area, then large multinational mining companies would become legally responsible as much of the land mined by ASM is owned by large companies.

4.3.1.6. Case Study: Cleaner and Equitable Technology Policy in Zimbabwe

The GMP team has worked with the Zimbabwe Ministry of Mines to develop capacity-building policies in artisanal and small-scale gold mining (ASM) communities. Following stakeholder consultations, GMP experts worked with various agencies to prepare Regulations on Mercury Management in ASM. These constitute multiple new steps in Zimbabwe, setting standards on practices to eliminate hazardous mercury emissions, exposures, and other environmental health aspects in ASM. Regulations also addressed the purchase, trade and storage of mercury. Meetings, small workshops and large seminars were facilitated by the GMP team with national and local officials from the Ministry of Mines, the Ministry of Environment, and the Ministry of Health, as well as mining associations (e.g. Zimbabwe Panners Association and the Zimbabwe Mining Federation) and other organizations.

These talks reinforced the shared commitment on policies to phase out mercury in ASM over the next year and in the long term. In the short term, policy efforts focus on instituting and enforcing clear regulations and codes of practice to minimize mercury-related and other environmental hazards in ASM. The Regulations on Mercury Use provide standards for amalgamation, including the use of retorts, and for reducing mercury in tailings. Specific provisions protect pregnant women and children from exposure. The regulations include mechanisms for community-based enforcement and monitoring. The policy to ban copper plates is designed to significantly improve environmental health and ensure that fair technology is used so that miners receive a reasonable percentage of gold from the ore they mine. The Ministry of Mines intends to introduce these laws as Statutory Instruments under the Mines and Minerals Act. A local team, led by the Department of Metallurgy and Institute of Mining Research, is conducting field demonstrations to educate stakeholders on how to comply with the standards (see page 33). It is not known if the legislation is passed at the time of writing, but based on discussions, government leaders are prepared to formally introduce the new laws after these demonstrations.

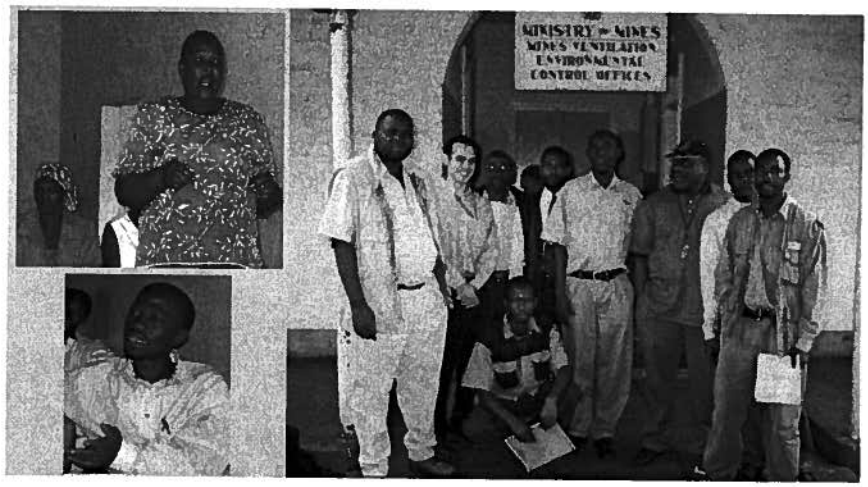

Fig. 8: Participants in Kadoma Governance Workshops

It may be important to note that the author received a letter from a miner *emphasizing* that these regulations are important – as millers need to be responsible. Millers, as the national expert David Love insists, "must be responsible for mercury use at milling centres" (Love, 2007, p. 5). As there are over 300 milling centers registered with the government (Zimbabwe Ministry of Mines, 2006), and since these centers are regularly monitored due to the sensitivity of gold trade, it is believed that national regulators could have resources to monitor the mills if mining officers travel together with gold inspectors, with combined environmental and socio-economic rationales for visits.

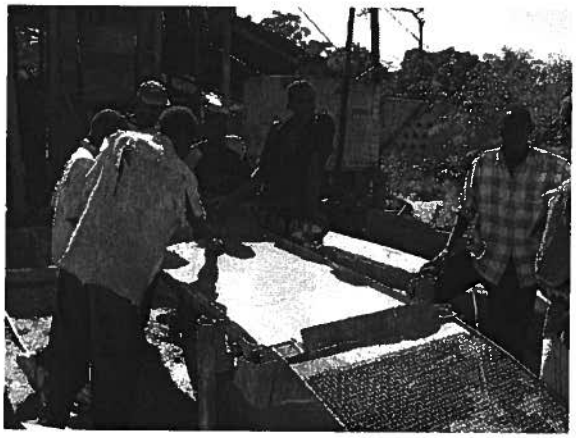

Fig. 9: Copper Plate at a Mill in Kadoma

4.3.1.7 Case Study: Multi-Actor Responsibility and Accountability in Zimbabwe

In addition to technical regulations on mercury management (described on the previous page), GMP policy experts prepared recommendations and draft regulation on Water Protections, the Duties of Milling Centre Managers and Claim-Holders, and other issues that resulted from the policy reviews and stakeholder consultations. These proposals were also presented and discussed on a preliminary basis with the national directors of the Ministry of Mining and Mineral Development as possible regulations to incorporate into law in 2007, subject to further discussions and revisions.

Most significantly, the draft measures propose clearer lines of responsibility for milling centre managers and claim-holders, with various environmental management issues addressed and penalties provided for legal infractions. As noted earlier, miners generally bring their ore mined to milling centers for processing. Mercury is used heavily on these premises, and tailings management and mercury handling often present serious risks to health and the ecosystem. Because the relationship of miners and millers is not generally of a formal employer-employee nature, traditional legal definitions of employer responsibility do not necessarily apply. The draft measures acknowledge the need for shared responsibilities among the different people involved in ASM mining and processing. Responsibilities addressed in the draft regulations relate to mine management, fair labor practice, safety, health and the preservation of the environment. Mercury issues are particularly emphasized, so that millers are responsible for sound mercury management on their premises and for ensuring compliance with regulations. Among the issues addressed, the draft regulations stipulate that milling centre managers must set aside a designated location for amalgamation and equip that facility with retorts. The provisions also stipulate that milling centers must not exist within 100 meters of water bodies, and the combined use of cyanide and mercury is prohibited. Other responsibilities, such as fair gold dealing, are also proposed to clarify the employer/employee relation between miners and millers.

4.3.1.8 Case Study: Implementation of New Mercury Regulations in Kalimantan

GMP policy experts conducted a series of consultation meetings with officials from the Indonesian Ministry of Energy and Minerals, the Ministry of Environment, the Central Kalimantan Provincial Government (Mining, Environment and Health Offices), as well as the District Environmental and Mining Offices. Consultations were also held with other stakeholder organizations such as the Indonesian Mining Association, in the discussion and development of plans to strengthen mining and environmental regulations on mercury management in ASM.

The District Government of Kalimantan adopted the GMP recommendations to introduce and implement regulations on mercury management, following stakeholder consultations from 2005 to 2007. The regulations address the sale and use of mercury, with focus on the regulation of mercury in gold shops. GMP efforts have focused on adoption and implementation of these regulations at the local district level to address critical pollution point sources and health risks. As part of the campaign to implement this policy, various gold shops have been engaged and have transferred to cleaner practices by using fume-hoods. *17 shops adopted fumehoods by March 2007.*

The Local District Government in the GMP Kalimantan pilot region has taken a leadership role in these interventions. Also, working with the National Director of the Legal Department of Ministry of Energy and Mineral Resources, the GMP established plans to discuss how the district-level developments could be applied nationally in the future as well under the Mining and Environmental Laws.

The successes of urban mercury reduction activities in the gold shops should not lead one to overlook the need to address the rural challenges (as shown above, where mining waste with mercury is emitted into water bodies). Gold shops have been the focus so far and remarkable achievements have been attained; but rural gold processing areas remain largely unaddressed so far.

The local government is therefore encouraged to continue addressing both urban and rural dimensions.

Fig. 10: Fume-hood for Gold Shop in Central Kalimantan

Fig. 11: Mining Waste with Mercury Emitted into a Water Body

4.3.1.9 Case Study: Mercury Policies in Laos

The introduction adoption of a code of environmental practice in Laos needs to be carefully complemented with an acknowledgement that ASM is a legal practice. GMP policy experts are currently preparing measures on mercury management to provide assistance to the Lao PDR Department of Geology and Mines in developing legislation and regulation on artisanal and small-scale gold mining. This is being formulated based on the health, environmental, technical, social and economic assessments of ASM communities in Laos and stakeholder consultations that were undertaken by the GMP. Various technical aspects of ASM are addressed in these proposed regulations: washing, sluicing, tailings management and disposal, mercury amalgamation, and other aspects. Examples of measures for incorporation are:

> "...The holder of an ASM license shall not heat mercury amalgam to recover the gold without using a retort, which must be used to contain the mercury vapour releases..."
>
> "...No person shall amalgamate the entire ore, through the use of a mercury-copper plate or putting mercury into any gravity concentrator or ball mill..."
>
> "...No person may discharge mercury, or mercury-contaminated tailings, into a water body..."

The new regulations have been embraced by the government. However, as representatives of Earth Systems pointed out, the current legal regime for ASM precludes the advancement of technologies beyond anything that is classified as "semi-mechanized" or higher.[4] Thus, these regulations arguably hinder the ability of ASMs to transfer technology to a significant improvement, through the use of ball mills for example. It is thus recommended that the legal regime be modified so that ASMs can legally register and legally improve technologies increase mechanization.

[4] Personal communication with Earth Systems representative, through email, January 2007.

4.3.1.10 Case Study: Mercury Code in Tanzania

The Tanzanian Government recently initiated policies to take new steps promoting capacity-building and regularization in artisanal and small-scale mining (ASM) communities. GMP policy experts held a series of meetings with officials from the National Ministry of Minerals in Dar es Salaam as well as local mines officers at the mining sites to discuss government and community-based policy issues. Working with the Office of the Commissioner of Minerals, meetings focused on environmental, health, technological, economic, social and legal issues from GMP assessments, which reinforced the importance of: a) having clear codes of practice in small-scale mining, and b) providing training and extension services in mining communities to promote the adoption of safer, more productive and environmentally sound.

The GMP has assisted the government in developing a Code of Practice for Small-Scale Mining, which offers standards and procedures of operation to supplement the 1999 Mining Regulations. Working with government and community stakeholders through a participatory process, the GMP has intended for this Code to serve two primary purposes: 1) show how miners can adopt good practices of small-scale mining and comply with the Regulations; and 2) assist government inspectors by identifying standards that relate to the Regulations and that will minimize risks to safety and the environment. The GMP also plans to assist the government in developing recommendations to incorporate mercury management in the Regulations, to address emission and exposure controls and strategies for minimizing mercury use by recycling safely and efficiently.

As Mutagwaba (2006) and Kitula (2006) each argue, the nature of reforming environmental policy needs to be oriented so that Primary Mining License Holders are given responsibilities as much as individual miners, if not more. Through discussions, the GMP sought to ensure that the Code of Practice

would be focused on the license holders who have financial capacities to purchase improved technology.

Fig. 12: Community Meeting on Mining Policy Issues in Geita District

The mineral processing challenges in Tanzania are of great concern and have drawn much criticism in the public media. It merits being emphasized that what Chunya calls "dormant small-scale mining policy" in Tanznaia is "causing disasters"5 Small scale and artisanal miners are languishing in various parts of the country, he argues, despite existence of an explicit national policy so designed to improve their lot. Mercury used excessively because miners remain illegal and have little access to micro-credit. The legalization policy came into being over the past ten years, being part of the national Mining Policy and Act of 1998, but continues to gather dust in government cabinets, with problems noted in 2004 (Mwaipopo et al, 2004) being even more severe in 2007 (Fisher, 2007). The government, under the policy, is supposed to commit resources towards undertake training on mining safety, transfer of affordable technology, imparting processing and mineral beneficiation skills to small scale and artisanal miners now scattered in different country locations. The policy has been "dormant" insofar government officers are rarely actually monitoring the areas.

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[5]Chunya, Felix Andrew. Dormant Small-Scale Mining Policy is Causing Disaster in Tanzania, 2008-03-21 http://www.ippmedia.com/ipp/guardian/2008/03/21/110791.html

4.3.2 Activity 3.2: Promotion of Compliance

Reinforcement of Government Capacity to Promote Compliance with Regulations in ASM Communities through Awareness-Raising, Monitoring and Enforcement Strategies

4.3.2.1 Overview

The idea of "compliance" can take on many meanings. Much literature emphasizes how in poorer countries, "environmental enforcement" by central government authorities has been ad hoc and generally ineffective, even contributing to illicit behavior (Duffy, 2005). The GMP has been assisting governments in the development of both regulatory and capacity mechanisms to manage mercury in ASM, seeking to find appropriate balances between top-down rules and bottom-up change strategies. The capacity measures show miners benefits of reducing mercury use in terms of efficiency and cost-effectiveness. It is essential that governments be given assistance to conduct community awareness campaigns, as well as establishing sustainable monitoring and enforcement strategies.

4.3.2.2 Discussion of Goals

The GMP aims to provide governments with tools and mechanisms to promote the following:

- National awareness of laws and associated requirements
- National awareness of mercury hazards
- National awareness of benefits of compliance through the use of environmentally sound and efficient technologies
- Integration of regulatory issues in GMP Education and Awareness Campaigns and Technology Demonstration Units
- National training of officers and enforcement agents
- National/local level strategies for monitoring/enforcing
- Identification of priority polluted sites (e.g. hot spots) for monitoring

4.3.2.3 Debating the 'Indicators of Success'

Some initiatives were taken to assist governments to train government officials on enforcement of key regulatory issues, to develop monitoring and enforcement strategies, and to facilitate community training on relevant laws within the GMP Education and Awareness Campaign and Technology Demonstration Units, demonstrating benefits of adopting best practices. According to initial plans, governments are provided by the GMP with tools and mechanisms that assist them to promote compliance with relevant environmental and safety measures, according to local priorities.

Who is the key agent to impose "compliance" and should it be promoted from the top down or the bottom up? These questions would ultimately require – and receive – a great deal of sensitive discussion from the GMP personnel. Some project planners exhibited strong reservations about using GIS (Geographical Information Systems) technologies to map the illegal mining activities in the Amazon as explored in the first case study below. Some project planners would also express strong reservations about introducing mercury regulations unless institutions were in place to "socialize" the regulations, as the Indonesian experience illustrates. To its credit, officials in the Ministry of Mines in Zimbabwe were also reluctant about adding mercury regulations – notably, Mr. Valentine Vera, the Chief Metallurgist – because it was not yet clear to him that alternatives besides the "mercury-copper plates" were available. Thus, he insisted that local university tests be done to test sluices as alternatives and centrifuges as alternatives. Arguably, for some observers, these processes demonstrate the need for recognizing how policies be adopted at the same time as careful "compliance" strategies, and also show how government workers are not necessarily villainous top-down planners (as often characterized in critical literature) but also interested in public health concerns being approached in a participatory way.

4.3.2.4 Case Study: Using Satellite Imagery to Inform Policy in Brazil

In regions across the Brazilian Amazon, mining causes significant mercury pollution, leaving profound environmental and social impacts. While the GMP's capacity building program works to reduce mercury-contaminated sediment movement into streams and develop proper native vegetation in the riparian zone, the project also undertook a review of Brazilian laws and policies of protected watershed areas and natural reserves. Additionally, the project has developed innovative GIS-based mapping techniques to assist in the discussions on government policies concerning the protection of the designated lands.

Natural reserves are the foundation of the Brazilian Forest Code, which, in 2002, set new regulations for the establishment of natural protected areas along hilltops, ridgelines, riparian zones, and upland catchments, relying on key geographic features of watersheds. This new legislation deters all commercial land use on reserves and imposes severe restrictions for uses such as mining. While this represents a remarkable advance in environmental legislation, these increased protections still remain a reality only on paper.

The lack of appropriate countrywide topographic datasets and the expertise required for manually mapping the reserves, along with difficulties of enforcing regulations "on the ground", were identified by government agencies as main barriers in enforcing the current legislation. Recent technological advances in Geographic Information Systems and high-resolution topographic satellite imagery, such as those provided by the Shuttle Radar Topography Mission, have allowed this issue to be revisited (Ribeiro, 2006). The solution to this problem, Ribeiro suggests, relies on accurately mapping and quantifying current and potential land use conflicts on a regional, watershed basis, thus enabling a reliable evaluation of its political and economic scope.

The GMP has been developing the application of this methodology for mapping permanent preservation areas in the Tapajos River Basin , located in northern Brazil. This will allow new ways of monitoring mining activities that relate to environmental

legislation on protected lands. This GMP program is also developing the use of the satellite imagery to track the mobility of mercury from mining sites in the sediments of rivers and streams, in order suggest new policy measures to promote capacity-building and reclaim impacted areas (Telmer et al, 2006).

However, critical questions should – and have – also been asked about the role of GIS for development. To what purpose does GIS serve local communities? How are ASM workers involved? A hope for developmental oftentimes seems to linger—that GIS can enhance environmental governance through "participatory" usages of information technology. If GIS has been celebrated for its increasing technological powers, however, skeptical and critical geographical perspectives have also emerged, calling into question the narrowness of technology-centered science that frequently overshadows the perspectives of "local people" in research and practice. A growing body of literature is questioning the lack of equity and effectiveness in promoting "crime mapping" as a point of emphasis for environmental governance in peasant communities (Dunn, 2007; Elwood, 2006; Williams and Dunn, 2003). As Williams and Dunn (2003) articulate, "The view of GIS, adopted by many, as an undemocratic and divisive technology is perhaps most poignant in settings where financial and skills-based resources are limited, notably in lower-income countries." Given this tension, project planners in the GMP were reluctant to use the GIS for any purposes that could lead to arresting miners. Further discussion with ASM communities on what priorities purposes GIS should address may be worthwhile.

4.3.2.5 Case Study: Local Governance Budgeting in Indonesia

As part of the TDU activities, Indonesian local government authorities launched new programs on technology transfer while training government staff to socialize the programs in the community. This involved public awareness and media campaign to increase knowledge about health hazards related to mercury and cyanide exposure. The GMP has partnered with local NGOs to implement the campaign and the government has taken a strong role, notably with NGO Yayasan Tambuhak Sinta (YTS) taking the lead.

In Galangan, Central Kalimantan, the Bupati, the President of the Local District Government in Kalimantan has dedicated finances in the 2008 government budget for technology education and assistance services to reduce mercury in gold shops and mining areas. Under this plan, 5 government departments – Mining, Health, Environment, Industry and Trade, and Education — are collaborating to target pollution point sources in gold shops as well as mines.

Fig. 13: Head of Local Government (Katingan District) Launches Policy Reform

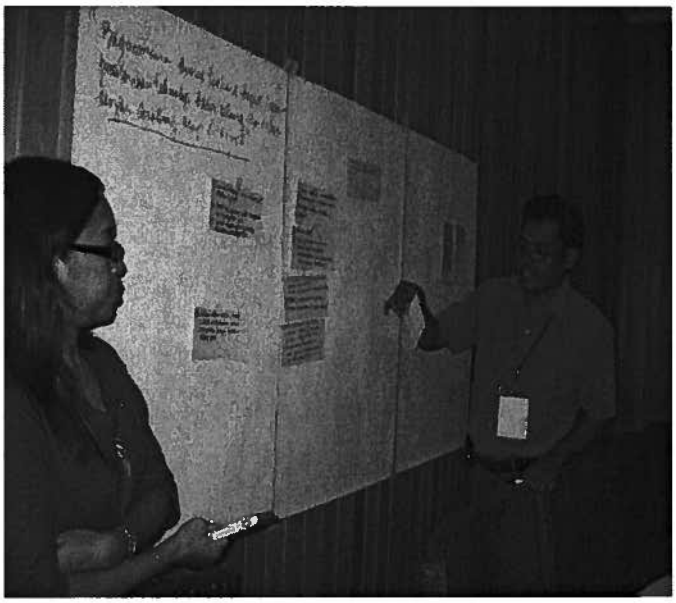

Fig. 14: Trainers in Central Kalimantan Discuss Governance Challenges

Fig. 15: Trainers Discuss Fumehood Design with Head of Katingan District

4.3.2.6 Case Study: Local Institutional Roles in Zimbabwe

Strengthening Public Sector Institutions for Delivering Technological Assistance in Zimbabwe's Mining Communities

A student named Trust, based at the University of Zimbabwe, is coordinating a GMP-supported study to show miners the benefits of replacing mercury amalgamation plates with sluices and centrifuges. He is working with a team of trainers at the university as well as with the Department of Metallurgy at the Ministry of Mines. The Department of Metallurgy is supporting resources for the tests and training activities.

Meanwhile, the President of the Zimbabwe Panners Association has conducted a series of demonstrations during policy consultation workshops. The ZPA is coordinating a program to engage its members nationally to promote training in all of the provinces of Zimbabwe.

Fig. 16: Demonstrations Led by the Zimbabwe Panners Association

4.3 Activity 3.3: Transboundary Mercury Trade

Assessment and Recommendations on the Transboundary Trade of Mercury with a View of Reinforcing Government Capacities for Regulating the Export and Import of Mercury Used in ASM

4.3.3.1 Overview

Mercury trade is of considerable international concern. As expressed perhaps most vigorously by Dr. Lars Hylander, there is an urgent need to reduce mercury pollution, as he sums up the spirit of action with the title of an article in Water, Air and Soil Pollution in 2001, "Global Mercury Pollution and its Expected Decrease after a Mercury Trade Ban" (Hylander, 2001). According to Hylander, a ban on the Hg trade in Europe and North America would significantly diminish global Hg pollution. A ban would also result in the closing of the state-owned Hg mine (MAYASA) in Almadén, Spain, the world"s most important anthropogenic Hg source.

A variety of studies have emphasized how mercury in ASM usually enters poorer countries legally – typically imported from countries in the European Union. As Veiga, Maxson and Hylander argued (2006), the EU, while gradually replacing Hg products and processes with more environmentally benign alternatives, paradoxically continues to produce virgin Hg at government-owned mines, further exacerbating a general global oversupply of Hg – evident from its historically low market price. "Political leadership," they argue, "is needed to avoid the transfer of excess Hg, and related health and environmental risks from the EU to third countries. Otherwise, the present situation will continue or even worsen, with no oversight or control of the global Hg trade in which the transfer of excess EU Hg to artisanal miners is favoured by low Hg prices relative to gold prices."

The GMP recognizes that its policy activities, therefore, must not only address the capacity of countries to track and regulate internal mercury trade, but also to regulate the export and import of mercury. Thus, in addition to developing and promoting regulatory mechanisms within the country, policies addressed at transboundary mercury trade are

also extremely important. These must be addressed both from the perspective of countries that are importing mercury as well as the perspective of countries that are exporting mercury.

4.3.3.2 Goals

GMP goals for this activity are to:

- Build on the analysis of data submitted by Activity 3.3 (sources and quantities of mercury imported, etc.) to reinforce and/or develop national plans to reduce transboundary trade of mercury to a minimum
- Review and compare reported use of mercury domestically and exported mercury statistics
- Review national waste management infrastructure and systems in the context of transboundary trade by national authorities and tools to measure effectiveness; review/develop frameworks that recognize mercury as a hazardous substance
- Develop national regulation and institutional policy to restrict imports of mercury
- Assess regional and global patterns of transboundary trades of mercury with a view to improving coordination among governments in developing standards or common approaches to reduce export and import
- Promote awareness about mercury in ASM as a means of encouraging industrial countries to ban or restrict the export of mercury to developing countries

4.3.3.2 Debating the 'Indicators of Success'

As expressed in Chapters 1 and 2, this study proceeds with the view that extensive restrictions in mercury trade need to be accompanied by extensive efforts at community capacity-building. As discussed below, international actions were taken by the GMP to support the restriction of mercury trade, and these actions have so far proven successful in that a global movement to reduce trade to developing countries seems to be forming, with Europe taking the lead.

4.3.3.3 Case Study: Steps Towards a Global Trade Ban

GMP Contributes to Global Awareness of International Mercury Trade Reduction Measures

The GMP submitted the report *"Global Impacts of Mercury Supply and Demand in Small-Scale Gold Mining"* for the 2007 U.N. Global Environment Ministerial Forum in Nairobi (February 2007, Nairobi Kenya). The report was circulated to member state governments globally and provided the foundation for discussions at the Forum. The GMP has been active in raising awareness of mercury and ASM-related concerns in international policy arenas. Team members have reached out to various media sources internationally, including newspapers, scientific journals, conference presentations, etc. to promote awareness of the issues and the policy initiatives underway.

Since 2005, the GMP has been contributing to the awareness of the landmark decision of the European Union Council of Environment Ministers in 2005 to end all international trade of mercury by the European Community. The EU decision, reached June 24th in Luxembourg, calls for a phase-out of mercury trade by no later than 2011. It also reiterates the EU commitment to achieving a global phase-out of all mercury production, use and trade, and reinforces the need for binding international law. The EU trade restrictions are the first effort to prevent the spread of mercury to countries in Africa, Asia, and South America, where mercury use is prevalent, particularly in small-scale gold mining. The EU, U.S., and China are the main exporters of mercury. A phase-out of mercury use in North America and Europe has made the developing world the primary destination for the world's mercury.

The United States recently cited the GMP report in explaining its policy decision (February) to refrain from releasing mercury stockpiles onto the global market.

Discussions are still being pursued on the global level to decide what actions countries will take to reduce trade.

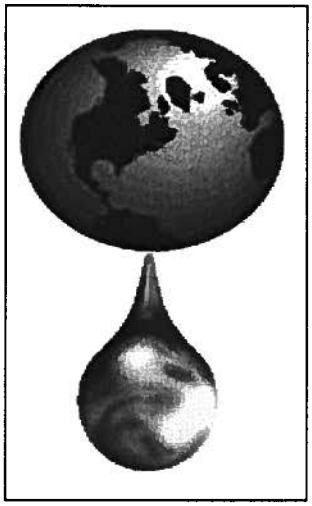

Fig. 17: GMP Logo

(designed to galvanize global awareness of mercury)

4.3.4 Activity 3.4: National Mercury Trade

Development of Knowledge and Tools for the Reinforcement of National Capacities to Track, Monitor and Regulate the Domestic Trade and Distribution of Mercury Used in ASM

4.3.4.1 Overview

Although not initially in the project document, the GMP recognized that tools are needed to reinforce national capacity to track, monitor and regulate the domestic trade and distribution of mercury. Information about the effectiveness of these factors could, on the one hand, lead to better knowledge about how much mercury was being diverted to ASM in given countries. This could help identify which countries were exporting to developing countries in order to better target advocacy campaigns. On the other hand, it was envisaged that this could also lead to strengthened capacities nationally to be able to regulate mercury and, wherever possible, halt the practices of what Hilson earlier described as "corrupt middlemen" who provide mercury for free illegally to workers in exchange for a guarantee of gold-purchasing rights at far below-market values.

4.3.4.2 Goals

GMP goals for this activity are to:

- Develop national inventories on quantities of mercury used in ASM, primary international sources, quantities imported, reported use of mercury where imported, domestic channels, primary dealers, prices, other purposes of mercury, and marketing mechanisms to, and within, the ASM sector
- Develop and implement tools to support sustainable monitoring of the import, sale distribution, and use of mercury
- Reinforce national capacities to detect and halt illegal traffic in mercury and stockpiling of mercury
- Develop and implement national legislation and institutional frameworks, including a legal base for regulating mercury trade and for the conduct of inventories and related activities, e.g. hazardous substance audits, disposal and phase-out plans, etc

- Assess regulatory options to address particular mercury trading systems, such as setting standards for market mercury prices; limiting free mercury dealing by gold purchasers; licensing traders; centralized control of mercury sales, etc

4.3.4.3 Debating the 'Indicators of Success'

Mr. Simon Handelsman was recruited to undertake missions in Kenya, Tanzania, Zimbabwe, South Africa and Brazil. His mission reports provided useful knowledge about the quantities of mercury trade and the problems that were experienced with regards to recording and monitoring. South African authorities reported exporting an amount of mercury to Zimbabwe that was entirely different from the amount that Zimbabwe claimed was imported from South Africa, for example, demonstrating how local capacities to monitor have been overwhelmed. In many instances, the quantity values were deemed to be unreliable, and a key lesson learned here is that UN agencies would achieve far greater results by focusing on transnational trade regulation rather than domestic regulation. Nonetheless, as the case studies illustrate below, some relevant in-country actions were taken to halt illegal trade.

4.3.4.4 Case Study: Mercury Trade in Zimbabwe

Regulating Mercury Trade to Miners: Proposed Legal Provisions in Zimbabwe

Numerous reports have emphasized that the development of monitoring and regulation of mercury trade would be a crucial step to decrease the negative health, social and environmental impacts caused by mercury in Zimbabwe. In December 2005, GMP policy experts prepared draft regulations under the Mining Laws to address trade and distribution of mercury within the ASM sector. These were discussed with Senior Directors of the Ministry of Mines and Mining Development as measures that could potentially become part of a larger national effort, including other sectors besides mining, to regulate that trade of mercury that is used for ASM. The draft measures address licensing for the purchase of mercury and for amalgamation purposes. Measures are also proposed to institutionalize community monitoring of the quantities of mercury used for ASM. Provisions for amalgamation licensing include:

"1) The use of mercury for amalgamation purpose shall require an amalgamation license, which shall be applied for by the manager of the mining location at which the amalgamation is being contemplated;

2) An amalgamation license shall be issued by the Mining Commissioner and shall specify the mining location at which amalgamation is being licensed, to whom the license is granted, and the site within the mining location at which amalgamation shall take place, designated by a plan.

3) An amalgamation license shall be valid for 1 (one) year and may be renewed.

4) In the event of breach of these regulations, the Mining Commissioner may cancel the amalgamation license for the mining location for which the breach has taken place."

Provisions for purchase of mercury include:

"...no person may purchase mercury for amalgamation purposes unless they hold an amalgamation license."

The drafted regulations include penalties for contraventions of provisions of these regulations.

It is not expected that these regulations would be easy to implement. Moreover, in many cases, adding regulations could arguable serve to bolster the powers of "mercury middlemen" who acquire licenses at the expense of poorer workers who many not acquire licenses. It is therefore concluded that this policy, among others, be further researched and re-assessed if this policy moves forward.

4.3.4.5 Case Study: Mercury Trade Policies in Kalimantan

Following discussions held in March, 2007, the District Government is pursuing measures to regulate the trade of mercury. This involves the development of a licensing system to ensure that gold shops manage recycled mercury appropriately, which will reduce overall use and emissions considerably. The Department of Industry and Trade in the District Government is responsible for implementing this measure. While licensing trade is considered to be an important part of the mercury strategy, it is believed that illegal mercury trading systems are difficult to change, but that recycled mercury can be managed appropriately. The emphasis is on regulating mercury use and appropriate technology in all instances. Pak Nasir, the local legal expert in Kalimantan, noted that the district government departments had coordinated an action strategy to control mercury and even to create a business out of recycling mercury (Nasir, 2007).

4.3.4.6 Case Study: Halting Illegal Traders in Brazil

GMP assessments were conducted to track the amount of mercury that is traded in Brazil as well as other GMP countries. In 2005, the total amount of mercury that was officially imported into Brazil was 43,260 kg, valued at 1,070,342 US$. Brazil has imported mercury from several countries, with the most coming from the Netherlands. As with most countries around the world where ASM is prominent, there has generally been a rising demand for mercury in the market due to the increase in ASM activities.

Brazil Mercury Imports, 2001-2005

Year	Value (US$'000)	Quantity (kg)	Unit Value ($/kg)
Total 2001	$378,875	62,545	$6.06
Total 2002	$327,343	68,885	$4.89
Total 2003	$484,216	80,779	$5.99
Total 2004	$469,300	37,788	$12.42
Total 2005	$1,070,342	43,260	$24.74

Fig. 18: Brazilian Mercury Imports

The above quantities were derived from the UN Commodity Trade Statistics Database (http://comtrade.un.org/) and verified by Simon Handelsman (a GMP consultant) with Brazilian government authorities. Following initial consultations on the link between trade and pollution, the Brazilian Government agreed to vigilantly monitor mercury trade to better promote ways of curbing the illegal distribution of mercury. The Brazilian Government authorities reported to the Global Mercury Project that 138 Kg of mercury were seized from illegal mercury dealers in 2006 (Simon Handelsman, 2007, GMP Consultant, personal communication).

4.3.5 Activity 3.5: ASM Sector Policies

Development of Recommendations to Governments on Policy to Enhance Organization, Coordination, and Empowerment in the ASM Sector

4.3.5.1 Overview

As ASM activities continue to be a major livelihood activity in Africa, Latin America and Asia, and various agencies have stressed the need for heightened attention on policy measures to promote sustainable livelihoods and protect the environment is increasing rapidly (UNECA, 2003; UNIDO, 2007a, Hinton 2006). It is often said that ASM activities are highly unorganized around the world, often operating illegally, outside formal economic marketing systems, and with little access to public services. An important component of the strategy to reduce mercury use in this sector is to support the transformation of ASM into formal and organized activity, so as to better promote health, environmental stewardship and social and economic well-being.

4.3.5.2 Goals

GMP goals for this activity are to assist governments in the following areas:

- Develop / strengthen the legal recognition of ASM activity and its associated categories (mining types – e.g. medium-scale, small-scale, artisanal, alluvial, panning, etc)
- Incorporate poverty reduction dimension in mining policy, recognizing both the constraints and the potential of ASM as an economic sector
- Formalize ASM activity with incentives for registration
- Simplify registration and licensing procedures
- Promote the establishment of national programs for technology assistance and training, (dovetailing with Activity #2)
- Promote the strengthening of, and implementation of, regulatory frameworks on environmental management, health and safety; and associated codes of practice, (dovetailing with Activity #3.3 and 3.4 related specifically to mercury control.)
- Implement standards from the ILO Convention on Health and Safety in Mines and other relevant standards

- Promote the granting of mining titles and designated areas for ASM, to discourage illegal mining in other territories; review the effectiveness and possible policy challenges of such existing programs (e.g. Brazil's "Reservas Gampeiros", created in 1988)
- Promote the development and implementation of incentive-based mechanisms to discourage illegal mining and illegal trading
- Promote access to formal markets and marketing mechanisms
- Address issues of concern for women and children in particular
- Address the functioning of various institutions, promoting coordination amongst government agencies and local participation in policymaking, as consistent with Activity #2, but for broader sectoral issues.
- Promote development and implementation of law enforcement strategies
- Mobilize resources to support local delivery functions

4.3.5.3 Initiatives

Preliminary legal studies on ASM sector policies were completed in four countries: Indonesia, Tanzania, Zimbabwe and Sudan. Recommendations from these preliminary reviews were delivered to the governments of these countries. Currently, the GMP team is conducting follow-up investigations to determine next steps and specific policy focuses for prioritization in each jurisdiction.

4.3.5.4 Debating the 'Indicators of Success'

Chapter 2 provided a discussion on "the political ecology of regulating miners." Insights from the various theories of "formalization" should be applied in the future to monitor the ways in which the GMP countries have adopted reforms – particularly to ensure that legalization systems are not excessively bureaucratic and that there are incentives for registration, such as access to education services and micro-credit. Below are summaries, which illustrate that national governance of ASM is difficult in Indonesia, but local governance agents in Kalimantan have taken some notable steps towards legalization. Tanzania's policy framework in currently under review; Sudan has recently committed to legalizing ASM.

4.3.5.4 Case Study: Elusive National ASM Governance in Indonesia

In November, GMP policy experts conducted a series of consultation meetings (pursuant the various GMP goals) with officials from the Indonesian Ministry of Energy and Minerals, the Ministry of Environment, the Central Kalimantan Provincial Government (Mining, Environment and Health Offices), and the District Environmental and Mining Offices. Consultations were also held with other stakeholder organizations such as the Indonesian Mining Association, in the discussion and development of plans to strengthen mining and environmental regulations. Working principally with the National Director of the Legal Department of Ministry of Energy and Mineral Resources, the GMP has established plans to draft district-level mercury management regulations that could be applied nationally in the future as well under the Mining Laws. Discussions with authorities also focused on the GMP Indonesian legal expert's report, including the following preliminary recommendations:

1. A Special Provision on ASM in New Mining Law

The Indonesian government is now seeking to produce a new Mining Law to replace the old Mining Law No. 11 of 1967. By establishing this law, the Government wishes to create a new paradigm of mineral development in Indonesia. The GMP legal report recommends the development of special provisions that facilitate the legal framework for ASM recognize its prominence and to promote the formalization of informal ASM activity, as well as the development of accompanying regulatory frameworks.

2. Regional Environment Act and Local Authorities

It is recommended that Indonesia apply a flexible national environmental policy system that leaves monitoring environmental protection powers to local authorities. It is also recommended that local district and provincial authorities be given greater powers to introduce local legislation on certain mining issues.

3. Environment Administrative System

It is recommended that environmental administration be clarified so as to ensure coordination among the relevant ministries and agencies.

4. Community-Based Environmental Management

Mechanisms for community-based environmental management are proposed.

5. Special Environmental Court

It is recommended that Indonesia establish an environment court as a judicial instrument for controlling disputes, incl. impacts from large-scale mining and ASM

7. Government Assistance to ASM

Measures are proposed for regulating ASM, developing alternative livelihood opportunities, supporting formal-ASM activities as a contributor to poverty alleviation, economic mechanisms, promoting women's rights, reducing child labor, etc

4.3.5.5 Case Study: District-Level Governance in Kalimantan

One of the most important issues that was identified in the UNIDO mission undertaken in 2005 was the need for a clear and simple policy to allow illegal indigenous miners to transform into legal miners. Discussions were held with government authorities at the national, provincial and local levels. Following decentralization of powers, it was agreed that the local District Governments now possess the primary responsibility to regulate this activity. Following discussions, in 2006, the District Government introduced a new law – "Regulation on People's Mining" (Law No. 3 of 2006) – creating a licensing system.

Some key parts of the new legal framework, as adopted, are:

- *the area that a people's mining permit given to an individual may cover is a maximum of 5 (five) hectares*

- *a co-operative may be provided with a people's mining permit covering an area of a maximum of 25 (twenty-five) hectares*

- *a people's mining area shall be situated on land and shall be at least 200 meters away from the bank of a river*

One necessity for successful implementation is to educate miners and provide incentives showing miners why it is beneficial to register. It is advised that the government should discuss this with miners, gain more inputs and monitor and promote the factors that will encourage compliance. It is recognized that registering legally would help miners to obtain secure land rights, thereby preventing conflict; it is also recognized that such registration can help improve their role in the economy. Additionally, the registration process could help ensure that miners manage the environment responsibly – a crucial aspect.

4.3.5.6 Case Study: Tanzanian ASM Governance

The Global Mercury Project, early on, submitted "ASM Policy Recommendations" to the Tanzanian Government. GMP policy experts conducted a series of consultation meetings with the Mining Commissioner and associated directors from the Tanzanian Ministry of Energy and Minerals as well as local district officials in Geita District. Discussions with authorities focused on the GMP Tanzanian legal expert's report, including recommendations on:

1) improving the economic contribution of ASM to poverty alleviation
2) women's participation in mining
3) child labor in mines
4) implementation of the Mineral Policy
5) legal and regulatory framework
6) licensing and registration procedures
7) technology assistance and capacity-building

The recommendations were incorporated into the government's 2007 policy review process. Additional next steps are being planned. Perhaps most importantly, it is the very report of the TDU team – the local training institution – that emphasized why *land rights* is a major issue for miners, as 90& of the mineral-rich lands in Tanzania are believed to be owned by large companies, precluding the status of ASMs (Sezinga et al, 2006; Fisher, 2007). The need for the government to make more land available for ASM has also been highlighted. If environmental projects do not follow up these requests, it may well be the case that "pollution" projects became little more, some stakeholders suggested, than a "band-aid solution."

4.3.5.7 Case Study: ASM National Legal Recommendations in Sudan

The GMP has undertaken consultations with national and district officials in the Geological Research Authority of Sudan (GRAS) and other government agencies in the Ministry of Mining as well as the Ministry of Environment, to follow up on the recommendations prepared by the Sudanese GMP legal expert. Key focus areas include:

1) Updating and revising the 1972 Mining and Quarries Act;
2) Legal and regulatory framework;
3) Coordination of government agencies – GRAS, the Higher Council of the Environment and Natural Resources (HCENR), Ministry of the Environment, in the Mines and Quarries Board, etc.
4) Enhancing rights of artisanal and small-scale miners and building capacity;
5) Recommendations for law enforcement

A key policy reform that has been incorporated into the new Mining Bill is a licensing system for indigenous mining. By licensing miners, this system may help to improve rights for community mining that will ensure a sustainable livelihood and secure environment. However, further attention is needed to ensure that mining licenses are granted equitably and to ensure that there are benefits of registering - i.e. greater access to formal economic, technological and health services, etc. The policy framework for indigenous mining should be examined with inputs from grassroots stakeholders.

4.3.6 Activity 3.6: Microfinance Policies

Development of Pilot Programs Enabling ASM Communities to Access Credit and Finances and Develop Organizational Structures to Support Technology Transfer

4.3.6.1 Overview

In order to successfully implement goals with respect to technology transfer and mercury control, many researchers have noted that ASM communities will need improved business skills and financial assistance (e.g. Pedro, 2006). Pedro's analysis suggests why development funds should be allocated towards trial programs. While the establishment of access to micro-credit for the tens of thousands of artisanal and small scale gold miners is beyond the scope of the GMP, the GMP recognizes the importance of promoting business skills, improving community organizational capacities for collective business, and developing some pilot programs to test the feasibility of various options in this regard. The actions below describe an effort to develop pilot programs.

4.3.6.2 Goals

The main goals of the GMP Micro-credit Initiative are to:

- Identify and assess the viability of micro-economic development / poverty alleviation models to assist the ASM sector to transfer to cleaner technologies - e.g. village banking, loan-based and equity-based financing schemes, hire-purchase schemes; donor and government support programs; finances through cooperation of ASM miners and mining companies
- Discuss with mining communities about specific micro-credit models and opportunities to develop economic strategies to support technology transfer
- Implement pilot micro-credit programs in GMP project sites, integrated with GMP Education and Awareness Campaigns and Technology Demonstration Units; and
- Develop sustainable long-term community-based financing mechanisms for ASM in GMP sites and nationally

4.3.6.3 Initiatives

Meetings with micro-credit institutions and banks have been underway in the GMP countries to explore different financial schemes and best opportunities for ASM financing based on interactions with the banks as well as with miner associations and cooperatives. Preliminary reports have been produced for Tanzania, Sudan, Indonesia, and Zimbabwe. Results obtained thus far reveal a number of strategic opportunities. Some banks expressed interest - potentially - in opening new branches in ASM communities. In other cases, banks indicated that they are already providing some funding to some miners for certain purposes (but only on a very limited basis); in other cases, banks have branches already in ASM areas and are very ready to evaluate applications for loans from miners (Mutagwaba, 2005).

All the banks and institutions with which the GMP team met emphasized that they are interested in developing these programs, keeping in mind that they are profit-based and have particular requirements for assessing any loan applications. Usually, criteria for accessing individual loans involves having collateral, however, many banks also have programs allowing groups without to collateral to take out shared loans on a collective basis where each member of the group holds the other accountable (based on "village banking" models and other models). The GMP team has indicated that the different options would be discussed with the miners to identify best opportunities.

The information regarding the banks' programs are being discussed in education workshops with mining associations and cooperatives in Educational Workshops. Additional plans for training on business skills, equipment sharing, cooperatives, collective lending, savings, etc. are also underway. In cases where miners are able to qualify for loans, they need to be able to keep records in order to function in a micro-credit institutional framework. Micro-credit institutions have some book-keeping materials that they use once a program is operational. However, the GMP believes that business skills are important even for miners who are not taking out loans, as "micro-savings" is also an important approach to build the capacity of miners to adopt substantially cleaner technologies that reduce mercury and improve gold recovery.

The following 4 phases of initiatives are key parts of the planning exercise:

Phase 1: Identification of Micro-Credit Opportunities and Challenges in ASM

a) conduct a preliminary itemization of the equipment and supplies (as well as costs) to be targeted for ASM capacity-buliding programs and assessment of the local accessibility of the equipment

b) review literature and readily-available resources to identify micro-credit schemes used in the country

c) consult miners' associations, government institutions, and relevant NGOs to identify their perception of opportunities for financial assistance and barriers to access, as well as contacting management of local financial institutions (micro-financing agencies and banks) to compile information on individual operating procedure

d) incorporate all readily-available knowledge on micro-credit schemes that are already in place into the community training in the Education Campaigns and TDUs .

Phase 2: Development of Models of Microfinancing for ASM

a) conducting consultations with miners, miners' associations, government institutions, and relevant NGOs to assess and explore opportunities for developing credit programs and removing barriers to access.

b) conducting consultations with management of institutions (government, banks, micro-financing agencies, NGOs involved in micro-credit work, etc,) to compile information on individual operating procedures, identifying key elements that make them suitable or unsuitable for ASM applications and possible modifications for adaptability to ASM.

c) design micro-credit programs based on the results of these consultations.

Recommended next steps:

Phase 3: Implementation of Micro-Credit Pilot Programs

Based on findings in Phase 1 & 2, Phase 3 will begin by consolidating a group of stakeholders who will implement a micro-credit program for a 3-6 month pilot period. The equipment demonstrated in the GMP training campaigns will be used for testing since the cost of them will be known and supply channels established. This program will be implemented and monitored with the goal of establishing longer term programs.

Phase 4: Establishment of Sustainable Financial Programs for Small-scale Miners
Once a trial of micro-financing has been conducted and success factors have been identified, a final report will be presented to possible donors/creditors to micro-financing programs indicating results of the field trials and giving recommendations for full-scale implementation.

4.3.6.4 Debating the 'Indicators of Success'

Does microcredit empower? This question has a long pedigree of study (Selinger, 2008) and cannot be answered in the limited space of this study. Certainly, any idea of "success" needs to be based on a scenario where improved business practice is effectively conveyed to ASM communities; information about micro-credit opportunities is effectively conveyed to ASM communities; micro-credit pilot programs become operational and can be evaluated so that lessons from this experience can be shared; long-term institutional initiatives are developed or planned.

This study facilitated discussion workshops with banks in Tanzania and with miners and trainers. As noted below, banks were somewhat ready to provide loans to well-established miners, but the experiences that miners and trainers provided indicate why banking programs have often failed. Primary Mining License holders have also experimented with loans (as the example of Blue Reef Mine in Tanzania illustrates) but these have had mixed results. Further study on formal banks and informal microfinance systems may be warranted. In both Tanzania and Sudan, the governments have pledged to devote special funds for microfinance pilot programs; these initiatives should be evaluated as they proceed.

4.3.6.5 Case Study: Microfinance and Miners in Tanzania

2006 marked the launch of the GMP Microcredit Initiative – perhaps far too late in the projects' development, as many people note that ideas about micro-finance takes time to develop into concrete actions, as trust is a key part of any financial credit system. Consultations with local banks and microcredit institutions were conducted to identify best opportunities for supporting economic loans-based development initiatives to support miners in adopting better technology. Specific technology has been itemized, with efforts underway to build local capacities for fabrication.

In Tanzania and Zimbabwe, following the consultations with banks, GMP held education workshops with miners to present and discuss different financial options for community empowerment through micro savings and loans. The workshops focused on how "village banking" can support technology transfer to increase productivity and earnings and improve safety. Working with officials from the government as well as the private sector, the GMP also linked these workshops to discussions of local community policy concerns, to gain community perspectives for the development of legal and regulatory issues on which the GMP is focusing. Miners have expressed strong interest in pursuing micro-credit opportunities through individual and collective lending programs. For the poorest miners, emphasis is on "village-banking models" where individuals unite to form "trust groups" (usually 5-8 people who know each other) to borrow money or equipment collectively and hold each other accountable for repayment.

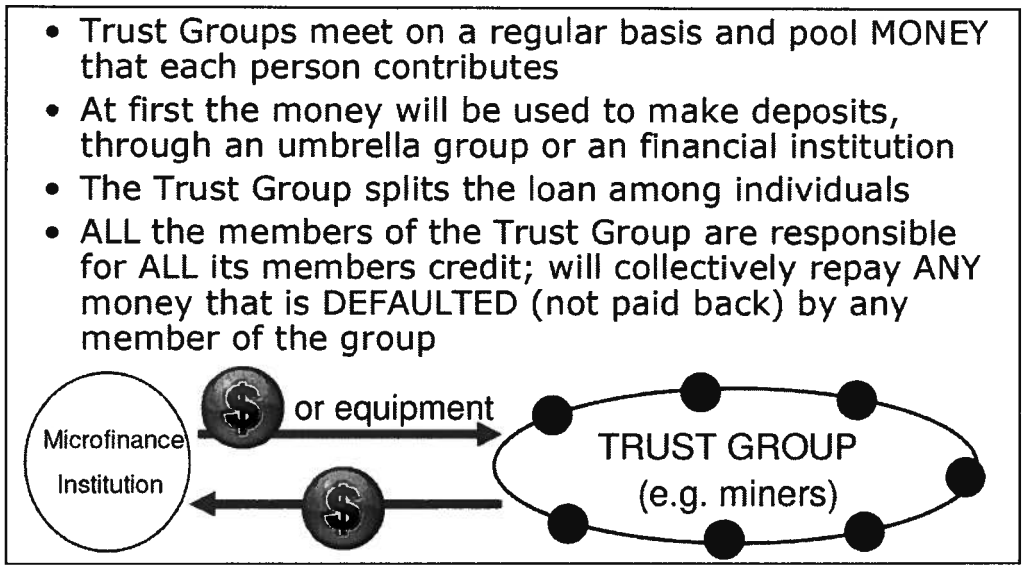

Fig. 19: Model for Microfinance "Trust Groups"

**This powerpoint slide is drawn from the following presentation – which was delivered at an interactive workshop: Spiegel, 2007, "Micro-Finance Strategies in Artisanal Mining Communities" – A Presentation to Local Mining Trainers in Geita, Tanzania, 30p.*

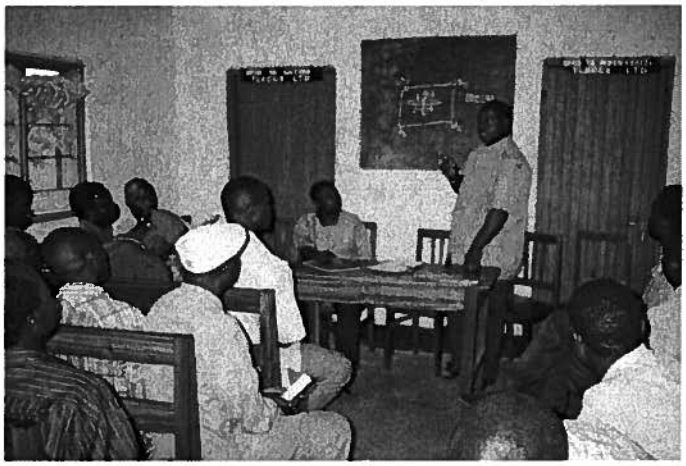

Fig. 20: Geita Mines Officer with Miner Associations

Organization and Leadership-Building in Tanzania

In May 2006, a team of GMP trainers participated in a pilot initiative to demonstrate and explore how training exercises on trust-building and co-operative organization could enhance livelihoods in ASM communities. The initiative demonstrated the benefits of group decision-making and teamwork in ASM as a way of promoting effective and equitable development –and enabling the conditions for the adoption of cleaner technologies that reduce mercury use.

These exercises followed a series of related training workshops on technology, business development and micro-credit in Geita. This initiative involved women and men in a variety of participatory exercises. Focus group discussion and activities with 13 women working at Blue Reef Mine with the following objectives: develop profile of specific subgroup involved in ASM, test activities designed to promote organizational change and cooperative behaviours, identify current barriers to cooperation and improved organization. Focus group discussion was followed by a series of activities based on economic game theory to derive scientific data on conditions for cooperative and other pro-social behaviour, variables impacting cooperation and factors determining the current uncooperative, suboptimal work structure.

Leadership analysis was conducted with a sample of miners in the local area and mining organizations. The level of leadership capacity varied significantly, across demographic profiles. The outcome of the experience confirmed the strong value in focusing on local leadership development as vehicle for improved community organization and development. The trainers who participated suggested that using the "trust games" approach could help mining associations organize themselves in new ways (ore-sharing, technology-sharing, collective loans, etc) that would raise standards of living and promote cleaner technologies.

The District Mines Officer, Mr. Kabadi, explained to trainers that primary mining license holders as well as miners should take leadership to improve organization. A discussion (photo below) among trainers explores different methods for engaging miners.

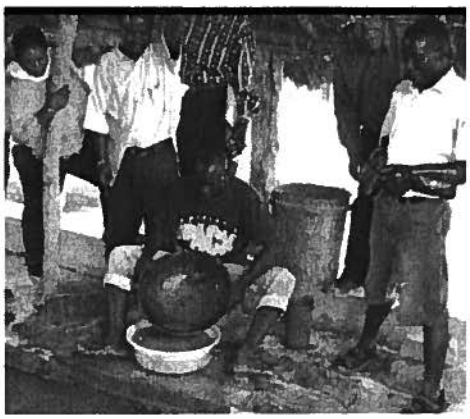

Fig. 21: Trainers in Geita

Results of Interactive Micro-Credit Workshop

A presentation was given outlining the goals, the scope, and the major findings thus far from the GMP Microcredit Initiative. The results of Dr Wilson Mutagwaba's microcredit study in Geita were presented by Policy Coordinator Sam Spiegel, leading towards a question period and discussion amongst the trainers. Focus was placed on 2 types of loans: group ("solidarity trust group") loans, and salary loans.

The trainers were familiar with microcredit programs in Geita, particularly FINCA. The consensus was that the conditions of FINCA's model requiring repayment sums every week would be too difficult to meet to be suitable for many miners. Many of the people present shared their direct experiences with microfinance or the experiences of their friends or people they knew in the community who had received microcredit. Although some of the experiences demonstrated cases whereby the loan recipient successfully paid back the loan, many of the experiences included instances of the following:

- Loans were not paid back to the bank
- The loan recipient did not have a plan for developing his/her business

- The loan recipient mistakenly believed that the loan was a "grant" or a "sponsorship"
- People were interested in loans but did not know how to start a business, how to organize and work with other miners, or how to manage their finances
- People who did not pay back their loan suffered severe consequences-e.g. their house was seized; they wished afterwards that they knew why loan repayment was necessary

Some people were familiar with programs to obtain credit from the National Microfinance Bank (NMB) as a deduction from salary, and the employer is the guarantee. In one instance, the employer deducts 1/3 of salary, with interest rate of 40%, and the recipient can receive loans up to 1.5-2.5 Million T-Shillings, with a repayment period over 2 years.

Mr. Korodias Shoo from Geita Gold Mine (GGM) indicated that it gives loans to employees (through NMB), and the company serves as collateral to the employee. The $ must be used for specified purposes, e.g. to build a house in Geita.

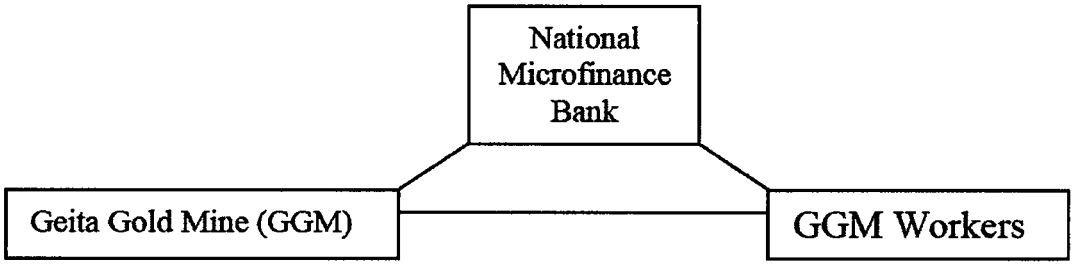

Fig. 22: Micro-Lending Relationship with Bank in Geita

Mr. Korodias Shoo also indicated that GGM previously tried to initiate a microfinance program for at small-scale miners - a Revolving Fund program - with Poverty Africa, a well-established microfinance institution in Tanzania, which lasted 2000-2005. However, the program was cancelled due to the failure to repay the loans.

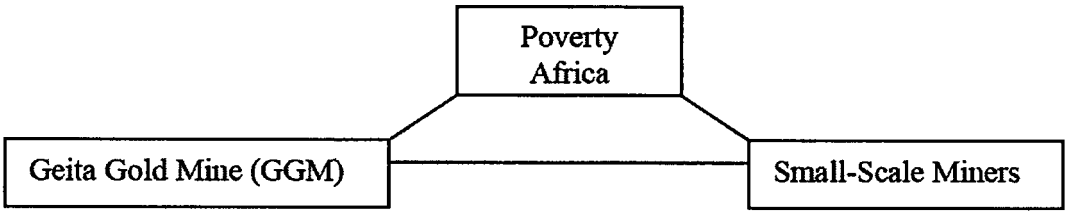

Fig. 23: Pilot Revolving Fund Model in Geita

Mr. Cadeo, owner of Blue Reef Mine, provided an overview of the business structure of his operation, which employs small-scale miners for various different stages of mining and mineral processing. He explained that he had previously initiated a program to provide education to his workers on savings and financial planning and loans for investment. He noted, however, that the program was largely unsuccessful due to poor management of the loans. He noted that many employees used the loans for purposes other than the intended purposes, such as entertainment and alcohol. He noted that some workers who received loans saw a decrease in efficiency and/or failed to come to work.

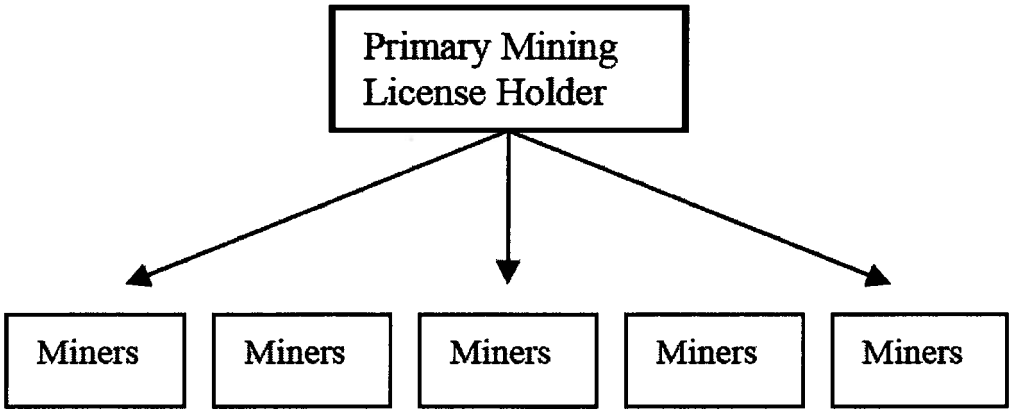

Fig. 24: Micro-Loan Program at Blue Reef Mine

The consensus in the group discussion amongst the Trainers reinforced the need for clear communication to miners about the requirement to *REPAY THE LOAN*. Clear communication needed to show miners both the benefits of loan repayment and the potentially severe consequences of non-repayment. Discussions focussed on how future

training and education activities with miners could combine (1) education on working collaboratively, through cooperative organization structures, in the various productive stages of mining and mineral processing; and (2) education on working collaboratively to access and repay microcredit loans.

Equipment-loans were suggested as a particularly important way to ensure that the loans are used for targeted purposes (improving technology and productive capacity). Also some people expressed that future microcredit programs should focus on those miners who are already well-organized and who have some collateral. Other people indicated their view that future microfinance models should work with Primary Mining License (PML) Holders – who already have collateral and organized business structure. Some people suggested that it would be difficult to work with miners (rather than the PML Holders) because they lack organization. For each type of miner, it was noted that microcredit programs should be tailored on a case-by-case basis.

Future discussions should be undertaken with miners and other stakeholders – microfinance institutions, equipment manufacturers, as well as the Tanzanian Ministry of Mines which recently undertook a study on Microcredit in Small-Scale Mining Communities and proposed a new Small-Scale Mining Loan Fund as part of its policy review. This consultative process should be aimed at discerning how a microcredit pilot program could be designed effectively to 1) maximize the impact of the loan on poverty alleviation by promoting collective enterprise development amongst miners; 2) ensure that the loan is used for equipment purposes and/or increasing productive capacity and transferring to environmentally sound technology; and 3) ensure that loans are repaid.

4.3.6.6 Case Study: Microfinance Project and Institutions in Sudan

Artisanal small-scale gold mining activities represent an essential livelihood source to some of the poorest people of Ingessana Hills in the Blue Nile State. The GMP has recruited an NGO, Practical Action, to organize miners into groups in order to enhance capacities to use collective micro-loans for transferring to improved technology that will reduce mercury use and emission. The pilot project is intended to be the seed of significant change in the Ingessana Hills, but would start small and simple, with 4 groups of 25 people each that will be trained to be successful small scale miners. This success would be key for encouraging other groups in the future. The four groups are selected to involve key figures in the artisanal communities.

Fig. 25: Women Miners in Ingessana Hills

They are being technically trained and supported to organize themselves. Since the compete kit (equipments to improve technology) may cost up to US$ 12.000 (international price tag), each group of 25 miners is trained to assess whether they could afford this kit though a micro-credit scheme, where the repayment should be done in monthly installments payable within 24 months period. It is important to emphasize that to make the repayment affordable for the 4 groups and consequently for the miners, a subsidy (%) from the government or private agencies for the costs of a kit is needed. Therefore, the GMP has developed contact with the governmental and

NGO partners as well as local manufacturers who "copy" cheaper alternatives. Hence the installments could reach around US$ 10/month per miner.

This system would substantially increase the chances of success of these groups – still requiring repayment, as they have a credit and they have to be well trained to manage their small business. The partnership with the government or private agencies is important, as it reduces costs for the miners as well as increases the chances for the community members to acquire efficient gold processing equipment. This subsidy should not be seen as a donation but as a facility for attracting the miners to be organized in groups, introducing the concept of small business and the concept of entrepreneurship and consequently increasing their chances of success.

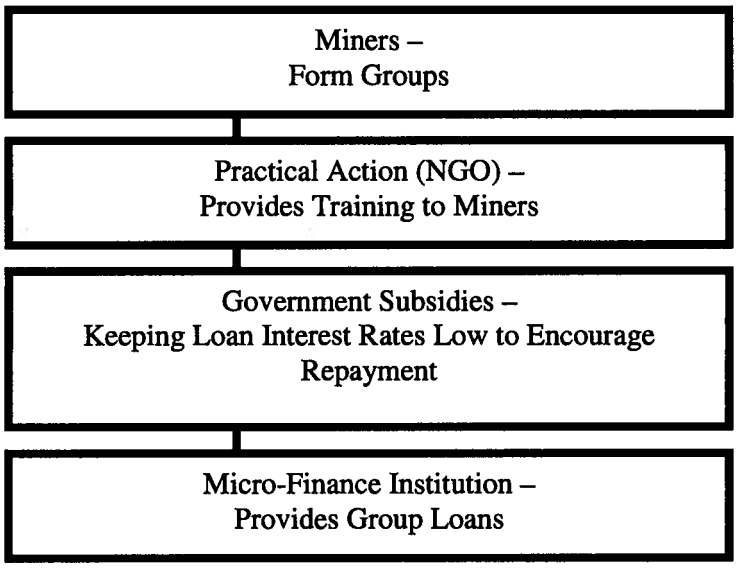

Fig. 26: Envisioned Microfinance Governance Structure in Sudan

4.3.7 Activity 3.7: Fair Trade and "Fairer Trade" Policies

Establishment of Certification Criteria and Alternative Processes for Fair and "Fairer" Trade Gold in ASM

4.3.7.1 Overview

Artisanal and small-scale gold miners are often paid very little for the gold they produce. As this is a poverty-alleviation activity, the miners involved are ill-positioned to demand better prices. Arguably, desperation leads many ASM gold miners to accept very low prices in exchange for free mercury – which they need to produce the gold, in the absence of capacity and resources to utilize mercury-free technologies or dramatically reduce mercury through the use of retorts.

In addition to Activity #3.5, which promotes legalizing, organizing and empowering the ASM sector, the GMP aimed to encourage the international community to promote fair gold trade, key not only to poverty-alleviation but also to controlling global mercury contamination. This led to collaboration with the Association for Responsible Mining (http://www.communitymining.org/) which is coordinating a global certification system for fair trade. However, it also involved non-traditional models for "*fairer* trade," through advocacy campaigns focused not merely on niche markets but for miners more broadly.

It merits being emphasized that critical literature about the limitations with "fair trade" as a model have emerged in large volumes. Most notably, Hilson's article "Fair Trade Gold: Antecedents, Prospects, Challenges" provides a critical engagement with the recently-formed initiatives, sponsored by the World Bank, to create "fair trade" markets in ASM. He argues that campaigns promoting 'fair trade gold' in the region should view host governments, and not Western retailers, as the 'end consumer', and focus on improving governance at the grassroots, organizing informal operators into working cooperatives, and addressing complications with purchasing arrangements – all of which would go a long way toward improving the livelihoods of subsistence artisanal miners. His study focuses on Noyem, Ghana, the location of a sprawling illegal gold mining community and provides wider argumentation on the dynamics of fair trade in the sub-Saharan African context:

> "In the case of artisanal gold mining in sub-Saharan Africa, the fair trade model being developed by ARM and supporters should be modified, emphasizing mainly the production-side elements which make artisanal gold mining a corrupt, highly impoverished and environmentally destructive industry. It is imperative that policymakers do not lose sight of these problems, which threaten to undermine any effort to promote fairer trade in the industry." (Hilson, 2008)

It is largely with this observation in mind that the GMP adopted a "fairer trade" as well as a "fair trade" policy goal. This means that looking at alternative ways to promote better pricing, marketing and production arrangements can lead to improved conditions. As described below, the GMP has worked directly with governments and directly with banks with gold refinery operations in developing improved access to fairer price for ASM.

4.3.7.2 Goals

Main GMP goals for this activity are to:

- Develop environmental, social, and economic criteria for Fair Trade gold, including mercury-related criteria
- Develop organizational capacity in mining communities for meeting progressive Fair Trade Criteria
- Development niche markets for Fair Trade gold by building on previous experience with fair trade markets and establishing supply chain networks which deliver gold from small-scale producers more directly to refineries and linkages between ASM producers to international markets.
- Communicate widely and promote the initiative's findings and program of action, including identification of models of certification and international certifying agency

4.3.7.3 Debating the 'Indicators of Success'

The case studies below each provide different insights about what "success indicators" might mean. In the first case study, collaboration with the Association for Responsible

Mining suggests a possible future adoption of certification standards where niche markets for "green gold" will encourage improved ASM practices. In the case of Tanzania, the GMP supported the Federal Bank of the Middle East in developing a gold refinery that intends to ensure fair prices for ASM workers. In Zimbabwe, part of the GMP's advocacy campaign focused on providing fair gold prices for miners in order to reduce smuggling; this advocacy is important particularly in light of the fact that police crackdowns to stop smuggling in Zimbabwe's mining sector caused widespread violence and community disruption. In Mozambique, a particular case study discussed below demonstrates how trade can be fairer and cleaner if miners have access to government gold-buyers directly rather than sell gold to mercury dealers. Each of these scenarios provides alternative 'fairer trade' developments or advocacies that can be monitored further.

4.3.7.4 Case Study: Global Fair Trade and Certification Standards

The GMP has supported the establishment of global fair trade certification standards as a catalyst to encourage equitable trade markets (that provide fair prices) and fair production standards (including social and environmental criteria). The GMP has networked with jewelers, other development projects, and other stakeholders in the global supply chain (figure below) to help develop pilot programs to support sustainable improvements in ASM communities.

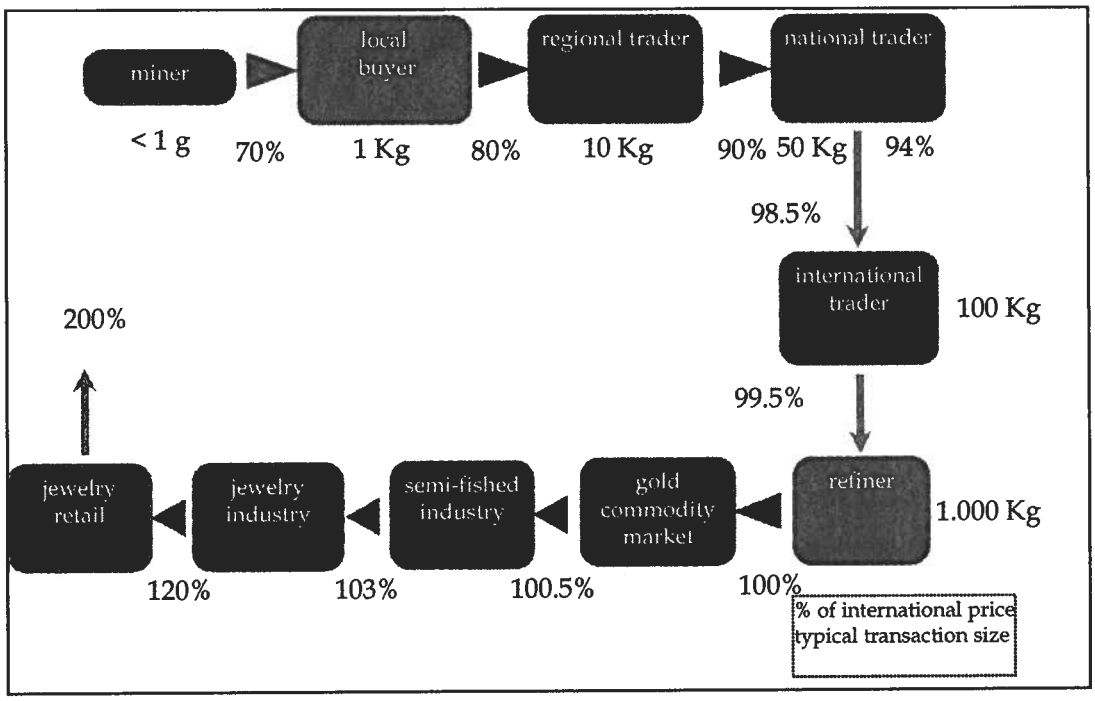

Fig. 27: ASM Gold Supply Chain

(Adapted from Schein, 2007)

The GMP has identified potential ASM communities suitable for Fair Trade implementation in Brazil. A review of factors at different sites led to GMP focus on a developing Fair Trade site in the mine operation in the Tapajos, Brazil - Paulo Carneiro Mine, which produces approximately 2kg of gold per month. The mine reportedly fulfills 50% of the Fair Trade gold requirements at present.

4.3.7.5 Case Study: Linking Banks, Refineries and Miners In Tanzania

The GMP conducted a series of consultations with the Federal Bank of the Middle East (FBME) in Tanzania, and its subsidiary Africa Precious Metals Ltd, to identify ways of strengthening economic services in artisanal and small-scale mining communities. Beginning in 2006, meetings were held in Dar Es Salaam to identify ways of improving gold marketing/buying services, gold refinery standards of operation (including safe mercury use), micro-credit services, and other aspects that would improve social, economic, environmental development in ASM communities.

By early 2007, the Federal Bank of Middle East (FBME Bank) Ltd has invested over US$1million in a new gold refinery plant in Tanzania's Mwanza region to add value to gold exports from small-scale miners. The FBME Bank Chief Executive Officer announced that the refinery would target small-scale miners, who without a defined market-have been loosing out to middlemen and businessmen in the black market, to smugglers and through money laundering. He said the new refinery would cater for small-scale miners by improving the quality of their gold and subsequently their standards of living.

The objective now is to collect "raw gold" through the regional miners associations at attractive prices and refine it to a finished product quality of above 99.5% before exporting it as "bullion gold". According to existing plans, the business would be expanded to other regions of the country, at the appropriate time.

The full production capacity of this unique and modern refinery is estimated at about 50 tonnes of gold per annum. Africa Precious Metals Ltd (APM), a subsidiary of FBME Bank Ltd, which constructed and is operating the refinery, and has opened four regional gold collecting centres at Ushirombo, Rwamagasa, and Nyarugusu called FairTrade Gold Centers (FTGC).

APM will reportedly also expand to other regions of Tanzania to assist and support small-scale miners for the fair trade of their gold on the world market. Delegations of other East African countries (Kenya and Uganda) and the Latin American countries

have visited these collection centers (FTGC) and would like to copy this unique project.

Tanzania has become one of the fastest-emerging gold producers in Africa, and seems to be the third-largest gold-producing country after South Africa and Ghana. The annual production of gold has increased from around 43.2 tonnes in 2002 to about 48.0tonnes in 2003. Tanzania now has proven gold reserves in excess of 1000 tonnes. In 2003 Tanzania reported a 20% increase in gold exports from US$ 41 million to US$ 50.4m.

The GMP aims to continue to provide assistance in ensuring that the refineries adopt best practices to meet environmental standards (particularly to minimize mercury use), and provide assistance to enable miners to sell gold at appropriate prices and obtain technical support.

4.3.7.6 Case Study: Advocating Fairer Gold Trade in Zimbabwe

Due to the current economic crisis in Zimbabwe, gold mining has grown in importance as a source of survival. Over 2 million people depend on artisanal and small-scale gold mining across Zimbabwe. As environmental threats have increased, the country has also seen growing conflict in the mining sector. In the first three months of 2006, police arrested over 30,000 indigenous miners. Smuggling, illegal mining, mercury and other problems have been cited as challenges. Irresponsible police intervention has also been cited as a major problem. GMP-supported assessments found that these problems were mainly fuelled by the underlying failure to implement economic policies that pay miners fair and appropriate gold prices, which forced them into desperate conditions of work and trade as a means of survival.

Between February and April in 2007, the GMP Policy Coordinator conducted several stakeholder meetings in Zimbabwe to bring together miners, government decision-makers from different agencies, and other organizations, to identify and advance strategies for bringing solutions to the country's challenges in the mining sector. The aim of the meetings was to allow participants to express a diversity of concerns to influence policy changes. In addition to conducting stakeholder meetings, the GMP Policy Coordinator participated in Special Committee Hearings in Parliament to review gold mining policies. A variety of GMP recommendations were generated (as in the reports of the Policy Coordinator), with the major recommendation being to increase the gold price to the official international gold price level in line with inflation.

Following advocacies by various stakeholders, in the second week of May, 2007, two major decisions were reached by the Government of Zimbabwe:

1) Gold Price Increased - The Reserve Bank of Zimbabwe (RBZ) raised the gold support price by 2,178% from Z$16 000/ounce to Z$350 000/ounce. This price is estimated to significantly reduce illegal trading, and provide an economic system that will make mining viable.

2) Gold Price Review Committee Established - Significantly, the Parliamentary Committee has moved to establish a review committee to ensure that gold prices are regularly evaluated and adjusted as inflation continues in the future, to ensure fair and appropriate gold prices.

These major policy developments require ongoing monitoring. They represent some out of the many policy recommendations that were generated to encourage positive changes in the mining sector to improve livelihoods, environmental sustainability and the country's development as a whole. It is recognized that "removing barriers to the adoption of improved small-scale mining practices" (the Global Mercury Project goal) requires an integrated approach that is responsive to local, national and regional needs, and that the GMP can continue to play a significant role in brining together stakeholders in problem-solving and strengthening institutions for development.

Further GMP work is recommended to follow up on these and other aspects of policy and governance in the growing small-scale gold mining sector of Zimbabwe.

4.3.7.7 Case Study: Tackling Poverty-Environment Traps in Mozambique

In 2005, a team conducted a pilot project in Mozambique to remove barriers to mercury reduction in Manica District. This project provided the earliest phase of the present study and has since been further discussed and published (Spiegel et al, 2006). The initiative was supported by Blacksmith Institute, in conjunction with GEF, UNDP, UNIDO and the Mozambique Ministry for the Coordination of Environmental Affairs. In addition to the implementation of a capacity-building program focusing on technology transfer, the fieldwork also yielded various policy recommendations for the government. These recommendations were prepared in the form of a report which was delivered and discussed with MICOA as well as the Minister of Mines and various directors in the Ministry. The recommendations, and the context for them, are discussed below.

During the pilot project activities, it was observed that the government buys only 1kg out of 40kg of gold being produced monthly in the region. In spite of the better price being offered by the government, miners are overwhelmingly selling their gold to the private buyers in the area because of three factors: 1) the private buyers are more present than the government in the mining sites; 2) the private buyers are providing mercury for free (in exchange for a guaranteed gold sale) in an area where mercury is difficult to obtain; 3) the miners are not confident that the government scheme will pay them for all the gold they produce

In light of the above factors, the GMP recommended that the government should buy gold on site. If the government is unable to travel to the mining sites to buy gold, then it is recommended that the government should receive the gold in an appropriate place where (a) mercury exposure is limited and (b) miners can see the gold being cleaned with acid from impurities.

Currently, government gold buyers are being contaminated when they buy gold with residual mercury in offices in the town of Manica. One of the solutions is that the government gold buyers should receive the gold in the lab, i.e. under

the fume hood and dissolve residual mercury with nitric acid, instead of receiving the gold in the confined office space where contamination is a factor. Doing this, these employees will be able to reduce their exposure to mercury fumes and this would also allow miners to see the mercury being leached directly and immediately see the gold that is recovered. This will increase the credibility of the government gold buyers and will attract more miners to sell gold to them. Additional fieldwork should identify and work with the gold buyers (both government and private) to promote the establishment of cleaner and more efficient technologies, improved facilities and better practices.

The 4 benefits of the recommendations, if implemented, would be:

1) improved occupational health in gold-purchasing facilities (less mercury exposure)

2) enhanced trust between miners and government gold-purchasers

3) increased government revenue from gold produced in the region

4) increased prices for miners for their gold

4.4 Activity 4: Global Partnerships for Development

Strengthening and Expansion of Global Partnerships for Development - Joint Activities, Regional Network Capacity-Building, Global Awareness and Resource Mobilization

4.4.1 Overview

The world-wide reduction of mercury use and pollution in mining, as called for by the Global Mercury Project, requires action at all levels of society – by the 55 developing countries where ASM is prominent as well as industrial nations. To sustainably address the challenge of mercury contamination for artisanal and small-scale gold mining, a broad-based approach to development is needed. The GMP is committed to work closely with other agencies, and governments of other countries, to strengthen and expand global partnerships for working together in joint initiatives – regionally and internationally, to promote global awareness of the situation in ASM, mobilize resources, and contribute to sustainable development.

4.4.2 Goals

GMP goals are to:

- Consolidate strategic partnerships to support regional and global action plans with major stakeholders and opportunities for environmentally sound management activities emphasizing mercury minimization and the strengthening capacity-building and technology in ASM and related developmental issues
- Develop joint activities with other initiatives of UNIDO, UNDP, GEF, UNEP and other international agencies; public authorities; international organizations; the industry sector; mining companies, NGOs; and academic institutions, identifying opportunities and synergies
- Identification of opportunities and implementation of programs that replicate GMP capacity-building in other countries (e.g. Mozambique, etc); formation of partnerships with other organizations and developing knowledge on mercury, ASM infrastructures and future needs and priorities

- Disseminate the produced GMP results and identify opportunities that will allow the project to continue beyond 2006 through self-financing, including conducting donor conferences to solicit financing and workshops with potential contributors;
- Enhance awareness of mercury and ASM issues on a global scale through public media and media directed at donor communities

4.4.3 Debating the 'Indicators of Success'

The GMP team has been developing regional and global partnerships with various intergovernmental agencies (UNEP and other UN agencies, etc); companies (such as AngloGold Ashanti, Newmont, etc); the USEPA (in Brazil); and various governments from around the world. "Success" arguably means that partner organizations are working together to promote sustainable development in ASM communities, and clearly these subjective interpretations require extensive institutional analysis. Some particular observation about "global partnerships" might be suggested here: for instance, a key insight, following Hilson's critique, is that project planning should not be distracted by the need to get further funds. "Successful" practices of developing global partnerships might mean, for instance, that UNIDO headquarters is responsible for securing further funding while project planners should be focused on the field.

One of the most important issues identified through stakeholder interviews in Indonesia, Tanzania and Zimbabwe as well as the other countries too was to ensure that the local TDU trainers had resources to continue training after the initial pilot training ended. Hundreds of trainers were certified by the UNIDO project. However, following the completion of the project, most training teams were immediately disbanded and no resources were made available for continued activities. This may ultimately be one of the most significant failures of the GMP and clearly a lesson learned here is to ensure that continuity in resource deployment is available. Two case studies below suggest other lessons learned: the former asking what the value is of "short term intervention project" through global partnerships and the latter exploring what the value is of university-community partnerships as a strategy for pollution abatement in ASM.

4.4.4. Case Study: Value in Short Term Projects? Mozambique's Trial

One of the global partnerships in the GMP experience was the short term intervention in Mozambique that subsequently created a lot of enthusiasm among donors in terms of the impressive amount of work that can be achieved in a small time frame. Yet, does this quick-fix/drive-by development work? To begin to answer this question, the Mozambique experience needs to be understood. The environmental health impacts of artisanal gold mining have been growing concerns in Manica District, Mozambique. Currently, more than 12,000 people in this region are involved in ASM, and most people extract gold using mercury. With support from Blacksmith Institute, experts from the GMP and the Ministry for the Coordination of Environmental Affairs carried out a pilot program to reduce environmental and occupational hazards by promoting safer and more efficient uses of mercury. Training methods were adapted from those being implemented in the 6 main GMP countries.

Assessments in Manica revealed that mercury management practices cause significant pollution hazards in this area; human exposure was a severe problem because miners burned the mercury amalgams in open-air bonfires throughout the community. Based on breath test samples, the average level of mercury in the miners in Munhena, the main training site, was 8.23 $\mu g/m^3$. Some burners had above 50 $\mu g/m^3$ (50 times higher than the WHO guideline for maximum public exposure to mercury vapor). A training curriculum was conducted to introduce miners and their families to retort technologies and related ways of reducing mercury emissions. Tests performed with home-made retorts, made of salad bowls, showed that mercury emissions can be contained to allow 95% of the mercury to be reused. Miners effectively embraced the idea of the retorts and expressed that the relatively inexpensive nature of this technology, costing less than US$4, was potentially quite feasible, especially after acknowledging the economic benefits that arise by reusing the mercury. The high price of mercury in Munhena (US$100/kg) is resulting in heightened attention on the need to minimize mercury losses.

Through discussions with community members and the government, the team identified follow-up plans including the establishment of a community amalgamation centre. The GMP recommends further capacity building in Mozambique and is planning further collaborative initiatives with the support of Blacksmith Institute, UNDP, GEF, and UNIDO in other countries as well, such as Guinea. This pilot initiative with Ministry for the Coordination of Environmental Affairs also generated policy recommendations that were delivered to, and discussed with, the Minister of Mines.

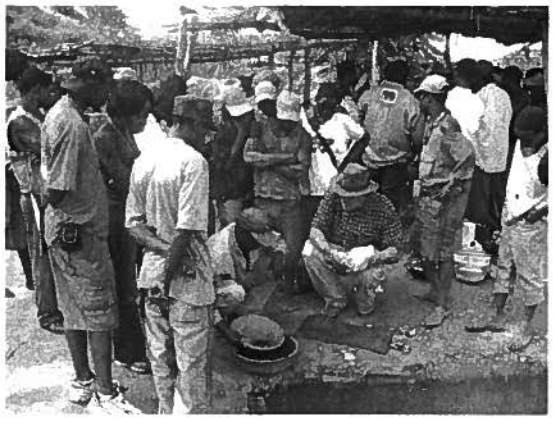

Fig. 28: Technology Demonstrations in Manica District, Mozambique

Yet the danger of quick fly-by/drive-by development model here also needs to be understood. Replications of the Mozambique intervention occurred in Senegal and Guinea – short term initiatives that allowed international experts to dialogue with local authorities and trainers. This model clearly allows a great deal of knowledge to be transferred in a short period of time. However, the current uncertainties with international donor programming is such that it remains unclear if follow-up will be undertaken. In Mozambique, miners have reportedly gone back to burning mercury without retorts after the intervention team left, and little monitoring has been undertaken. Clearer agreements on the responsibilities of local authorities – as well as international funders – might arguably help in the future to ensure that local monitoring is sustained while international resource support is obtained.

4.4.5 Case Study: Integrating Curricula into University Education

Artisanal gold mining is the main profession of more than 60,000 people in Ecuador, who often use significant amounts of mercury in addition to cyanide. In 2005, the Global Mercury Project began a partnership with a project in Ecuador supported by the Canadian International Development Agency, entitled "Sustainably Managing Environmental Health Risks in Ecuador". The project is applying an ecosystem approach to health in strengthening core skills, knowledge-exchange, and community empowerment to address environmental determinants of health in selected regions of the country. The GMP has utilized its knowledge-base to contribute to this project by developing training curricula on environmental management in mining, with emphasis on mercury. These curricula are now being utilized by various university-community development programs in Ecuador.

The project is based at the Center for International Health at the University of British Columbia (UBC) and works with three main universities in Ecuador – the University of Cuenca, the University of Machala and the University of Bolivar - to establish capacity to sustainably manage environmental health risks. In undertaking this challenge, partnerships were formed with institutes in Cuba and Mexico to reinforce "South-South" linkages that can enhance sustainability through regional networks of excellence. The project, which has received the BC Centre for International Education Innovations Award, calls for multidisciplinary approaches to promote institutional capacities and community development. Innovative training curricula were developed to manage not only problems of mining contaminants, but also pesticide exposure and vulnerability to vector-borne disease such as dengue and malaria. A series of problem-based learning modules were developed, thus breaking down the barriers between universities and communities and reinforcing local leadership through on-site community training. For the modules on mining and the environment, emphasis is placed in two regions in the country - Machala and Portovelo.

The national scope of the endeavor provides an exciting platform for building interregional, intercultural and inter-university links as well. These elements reflect

what the GMP has contributed based on its experience in the six main GMP countries. Involving graduate and undergraduate students from UBC as well as Ecuador's universities provides an invaluable educational opportunity for integrating the lessons of the GMP into the knowledge and capabilities of community learners and leaders. Partnership talks are further exploring how this program could continue to develop in collaboration with Canada's Global Health Research Initiative. This model, many have emphasized in multiple GMP countries, should be pursued further – i.e. international support for universities can be a powerful way of assisting ASM communities. Many have discussed the role of training engineers at universities. This study would suggest that university students and faculty could also be supported to continuously monitor the policy dynamics and the institutional roles in addressing ASM.

CHAPTER 5: CONCLUSION

ASM is often characterized by extensive negative environmental, health, and socioeconomic impacts. However, ASM also provides livelihoods for a growing number of people in developing countries around the world. With little or no investment capital and limited technical skills, many miners are in great need of resources to help them minimize the negative impacts of their livelihoods. Worldwide awareness of health and environmental problems and the growing number of children involved in ASM, combined with the reality that mercury contamination crosses national boundaries, has led to much needed international collaboration. Simple technological solutions now exist that can reduce mercury exposure while promoting more cost-effective operations. However, there are several major challenges to their implementation; chief among these is that controlling mercury emissions requires addressing the driving forces and pressures that have been barriers—including poverty, disease and institutional problems that create social inequities for ASM communities.

Linking experts from different disciplines to create common frameworks for hazard reduction and livelihood development is clearly needed. Since the ASM sector in developing countries has seen few examples of long-term community-based efforts combining ecological, technical, sociological, economic, and cultural aspects, new and positive examples are greatly needed. Growing emphasis on the role of interdisciplinarity is likely to generate valuable insights and lessons for other ecohealth research and projects that seek to integrate health, ecological, and economic concerns in community development. As the above analysis has suggested, mining technologies and community health are inextricably linked with political challenges, and interdisciplinary research should consider moving from the "soft side" of ecosystem approaches to health to consider the more critical insights of political ecology literature too, attempting to understand how policy development processes are imbued in politics. By appreciating the politics of ASM development, hazard reduction, institutional commitments to provide resources for training, and a variety of other legal and governance strategies, this study has shown how mercury pollution can be influenced by a number of ways that extend far beyond the traditional top-down toxic control paradigms that have been tried – and failed.

Knowledge exchange between regions and countries may prove to be useful in the coming years, particularly to compare and contrast the developments of the post-GMP pilot phase and how different policy models or training programs materialized in different ways. This study has not attempted to make final judgments about success or failure (evaluations in the future will accomplish that feat), but rather to propose a way of exploring the processes of policy development and the dilemmas that emerged. The dilemmas of environmental, socio-economic and political decisions requires a careful eye that many involved in the GMP believe has been seriously missing in the project's original design but, through multiple country experiences, was expanded. A broader approach of learning was thus encouraged through a diversity of training processes; this study has thus shown how a policy framework can adapt, grow and diversify in order to address multiple viewpoints and contexts. Action research and professional reflection provides key opportunities for understanding the actual processes of attempting to reduce mercury pollution in ASM. Connecting the challenges to broader governance challenges in any given country is also clearly needed, with long-term field engagement to gauge institutional roles.

Governments where ASM is widespread often have limited resources, with budgets that allow little room for wasted spending on inefficient environmental policy implementation. Based on consultations with multiple stakeholders, a common view expressed has been that top-down initiatives based on regulatory approaches have limited application and effectiveness, especially due to widespread illegal mercury markets and mining activities. The Mongolian Government's recent decision to ban mercury may ultimately, scholars suggest, put mercury use and ASM generally into an illegal space that cannot be regulated productively or at all. Unless policies allow educational engagement with ASM workers, many experienced workers suggest that mercury will continue as an "agent of poverty" in the foreseeable future. On an aggregate international analysis it can safely be said that bottom-up initiatives based on legalization, participation and cooperation between miners, government, and nongovernmental agencies offer greater promise for community impact. Recognizing the need for synergy between policymaking and practice, the GMP has been encouraging the involvement of local inspectors in training workshops along with leaders of mining groups. Through the GMP, the United Nations

has opened up numerous collaborative opportunities, embracing an ecosystem approach to address these challenges. Alliances with new donors and partners, including the private sector, could further reinforce these global efforts. Careful monitoring and future study of the effectiveness of the proposed interventions, especially in terms of the impact on health, ecology, and economies of local communities, could help decision-makers in the future to decide whether policy reform processes are working or not.

Who are the key policy and governance agents? In some sense, this study has suggested that all stakeholders have a role to play in informing policies and implementing policies that, in some way, influence the dynamics of mercury and ASM. Some policies are formal, while others may relate to ways in which an institution is simply accustomed to operating. Indonesia's new mining licensing system should be recognized, as should the legalization system in Brazil, for instance, as cases where local governments have demonstrated leadership. Donors should learn from these experiences and, in the future, should consider prioritizing the development of project structures with local governments rather than national governments. Banks should be engaged further to develop microfinance systems tailored for ASM. The United Nations itself has been at a crossroads over the past three decades and its evolution suggests a changing commitment towards mining. After years of inaction on the issue of mercury in ASM, the UN Governing Council Session in Nairobi, 2007, finally put mercury in ASM into the spotlight. International guidelines for mercury in ASM might, perhaps, become a basis for engaging more governments and civil society agents in an effort to development collaborative action plans that target priorities. The GMP has now provided lessons that can inspire policymakers to do more. More needs to be done to carefully monitor the effectiveness of the various interventions already undertaken, especially in terms of the impact on the lives of the communities. More needs to be done to ensure that local trainers who have been trained and now await a "second phase" continue to have resources to be able to train miners who now appreciate mercury's danger. If researchers and policymakers are to have a meaningful and positive impact, more needs to be done to ensure that "the mercury debate" isn't locked in an endless polemic of hazard fixation; the world needs *commitments* to discuss, support and deliver *solutions*.

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