

**Responsible Sourcing
of Artisanal Gold in
Eastern DRC**

**Pilot Status and
Planning**



**PARTNERSHIP
AFRICA CANADA**

**Responsible Sourcing of
Artisanal Gold in Eastern DRC**

Pilot Status and Planning

Shawn Blore

Managing editor:
Joanne Lebert

ISBN 978-1-897320-27-3

© Partnership Africa Canada
July 2013




**PARTNERSHIP
AFRICA CANADA**

331 Cooper Street, Suite 600
Ottawa, Ontario, K2P 0G5, Canada

www.pacweb.org

For permission to reproduce or
translate all or parts of this
publication, please contact
Partnership Africa Canada.



Partnership Africa Canada is grateful for project support provided by the
Public-Private Alliance for Responsible Minerals Trade (PPA).

www.resolv.org/site-ppa

Implementing partners include:

Diamond Development Initiative (DDI): www.ddiglobal.org

Ministère des Mines de la RDC : www.mines-rdc.cd

Centre National d'Appui au Développement et à la Participation Populaire
(CENADEP) : www.cenadep.net

Organisation Concertée des Écologistes et Amis de la Nature (OCEAN) :
www.oceanrdc.org



Summary

The present report is the second in an on-going series detailing progress in a Partnership Africa Canada pilot project aimed at certifying and exporting conflict-free artisanal gold from the Eastern DRC.

Key elements of this report include:

1. Results of the site selection and research phase, including detailed maps of the mining areas targeted for miner enumeration. These include:

The corridor stretching from Nia-nia to Wamba (see Map 1)

 - The corridor from Bole Bole to Mambati (see Map 2)
 - The Mangi mining area to the northwest of Banalia (Map 3)
 - The Bondo mining area (Map 4)
2. Preliminary results on the on-going Enumeration phase.
 - Enumeration teams, transportation and systems in place
 - First four-day enumeration drive completed April 6, 2013
 - 1987 miners enumerated; digitization of those records proceeding
 - Total number of expected miner enumerations approximately 10,000
3. Detailed implementation plans for the upcoming Mechanisation Phase
 - Two or more pilot sites likely
 - Appropriate technology not finalized, but likely to be lower tech than initially envisioned
4. Estimates of gold production from the pilot mechanisation sites, including volumes and prices
 - Field research indicated current gold production per miner per day of 0.17g/miner/day
 - Gold prices at mine site vary from 22% to 44% below world price
 - Gold production from each mine site targeted for mechanisation outreach estimated at 350g/month
 - Total pilot production therefore likely 700g/month if plan for two sites proceeds
 - Gold production from targeted artisanal mining areas estimated as follows
 - 15.5 kg/month, counting mine sites enumerated during research phase
 - 44 kg/month, using Enumeration Phase estimates of 10,000 miners in targeted areas
5. Preliminary plan for scale up and longer term sustainability of project presented



1. Purpose of Project

The PAC pilot project is a trial effort aimed at testing technique and approaches for formalizing artisanal gold miners in the DRC, and through this channelling the gold produced by these miners into legal export channels. Currently, much of the DRC's gold production exits the country illegally, thus evading government export royalties, fostering a climate of illegality and contributing to instability and conflict in the DRC and the region.

Unlike the 3T minerals (tin, tungsten, tantalum) there is no market premium for conflict-free gold, and so no obvious lever to force artisanal miners into legal channels. The core idea of the project is that artisanal miners can be enticed into accepting the costs associated with formalization and legalisation, provided these costs are kept within quite constrained limits, and provided clear and obvious benefits arrive as a result of formalisation.

The benefits envisioned in this pilot project are firstly enumeration, and secondly technical extension services leading to an increase in artisanal production. The technical extension services will be offered as an explicit trade – technical assistance for legal sales. By linking these two elements, PAC hopes to drag the artisanal gold production at its test sites back into legal channels. Once the pilot project has provided proof of concept, follow-up projects can extend the approach to miners and mine sites beyond the initial test locations.


2. This Report and its Relationship to Previous Publications

PAC's initial proposal, *Tracking, certifying and Exporting Artisanal Gold from Eastern DRC*, presented the basic concept underlying the pilot project - namely that artisanal miners could be enticed to sell their gold through legal channels if offered appropriate incentives, including enumeration and technical outreach designed to augment their production.

The proposal further presented the stages through which the project would be carried out, including a preliminary research phase, a miner enumeration phase, a mechanisation phase and a tracking phase. As implementation has proceeded some changes to the original schema have resulted, in ways described below in Section 3.1

The first PAC publication, *A Pre-phase Report on Site Selection*, detailed the extensive consultation and field research involved in selecting the mining areas that would be the target of the later enumeration and mechanisation phases. The report presented the criteria by which mining areas were selected, which included obvious elements such as good population of miners and a reasonable production of gold, as well as conflict-related elements such as a reasonable absence of overlying mineral claims, and a reasonable level of security.

One key finding of that report was a decision not to target the Bunia-Watsa corridor, as this area is nearly 100% covered by active PE (Exploitation Permits) held by the Kilomoto and Sokimo companies. Additionally, though initial research had indicated some promise to the Mambasa to Beni corridor, this area was dropped after repeated Mai Mai raids on Mombasa and the gold sites of the corridor made it clear that this area did not meet the requisite standard for security.



That report also presented extensive baseline data on nearly 20 artisanal mine sites, including data on location, miner population (including women), production volumes and technique, use of mercury and other significant baseline data. The data from that phase, particular relating to gold production and pricing, is utilized again in this report.

This second PAC report, *Responsible Sourcing of Artisanal Gold in Eastern DRC: Pilot Status and Planning*, details the accomplishments of the on-going Enumeration Phase, and focuses in specifically on the techniques and approach to be utilized in the critical upcoming Mechanisation Phase.

All project reports are available on the PAC website: www.pacweb.org

3. Project Implementation

The initial project conception envisioned some preliminary baseline research, followed by three formal project phases: a enumeration phase, a mechanisation phase, and a tracking/certifying/sales phase. As the project has developed, the preliminary baseline research extended slightly into the enumeration phase, while the tracking/sales phase could be melded together with the mechanisation phase, if the release of funds can be timed accordingly.

3.1 Pre-phase: Baseline Research and Site Selection


The first PAC publication, *A Pre-phase Report on Site Selection*, details most of the activities and results of this research phase.

3.2 Phase I: Enumeration

For the enumeration phase, PAC opted to work in partnership with the Diamond Development Initiative (DDI), a sister NGO also based in Canada which has had excellent results enumerating artisanal diamond miners in the Kasai provinces in south-western DRC.

The key to DDI's approach to enumerating artisanal producers is to involve all the important actors in the enumeration process: government, civil society and industry are all represented on the enumeration teams, which travel together in a group to artisanal exploitation areas in order to seek out and enumerate miners. The fact that enumeration teams come to the miners obviously facilitates adherence. The fact that civil society and industry representatives are present on the enumeration teams helps build the trust necessary to give miners faith in the process.

As part of the Enumeration Phase, in January 2013 a mixed team of PAC and DDI representatives (both international and Congolese) travelled first to Kinshasa to meet with senior government personnel, including the Minister of Mines and the national head of SAESSCAM. These two key figures both expressed full support for the project. The team then travelled to Kisangani to meet with provincial officials, including the new Provincial Governor of Orientale, as well as the new Minister of Mines. These two important dignitaries also expressed their full support. The team further met with the heads of Division de Mines and SAESSCAM, in order to work out modes for further cooperation. Congolese civil society organisations with particular expertise in the natural resources sector, among them CENADEP and OCEAN, were also extensively consulted during this phase.



During this field visit a number of potential candidates for the position of local project manager were identified and interviewed. Shortly thereafter a Congolese project manager for the Enumeration Phase was hired.

Since then, the local project manager – in cooperation with experts from DDI and under the joint supervision of DDI and PAC – has taken over the day to day operation of the Enumeration Phase. A project office has been established in Kisangani. Outreach work was then performed, and candidates for the joint enumeration teams were identified, contracted and trained.

A delay of some three weeks in the start of enumeration resulted from the purchase and transport of motorcycles from Kinshasa to Kisangani. However, rented motorcycles were obtained in the meantime, and so enumeration was able to proceed.

The first four-day joint enumeration mission was completed April 6, 2013. That mission was able to enumerate 1987 artisanal gold miners. The data from those enumeration sheets is currently being input into the project database, while the enumeration teams prepare for their next mission.

DDI estimates that the Enumeration Phase should last somewhat over three months, and that something close to 10,000 individuals should be enumerated by the end of the Enumeration Phase.

3.3 Phase II: Mechanization and Sales


The second, Mechanisation Phase, is in many ways the capstone of the project, the key element towards which all other phases have been building. Establishing local partnerships, verifying local conditions, choosing site locations, enumerating miners, all are useful prerequisites for the *sine qua non* of a successful gold pilot, the artisanal production and sale of legal, conflict free, potentially certifiable gold.

This selection will delineate PAC's specific step by step strategy for implementing the mechanisation phase. The plan has been developed through a process of field investigations, consultations with miners and traders, and extensive discussion with DRC experts and DRC civil society.

While the concept underlying the mechanisation phase is simplicity itself – a trade of technical know-how for legal sales – turning that concept into a working reality is a rather more complicated prospect. Developing a working plan revolved around addressing a series five related issues:

3.4 Five Issues for Mechanisation Phase:

1. Location (i.e. which specific dig sites?)
2. Mining Partners (which miners/type of miners to work with?)
3. Enforcement of the Basic Agreement (how to enforce technical support for legal sales)
4. Choice of Appropriate Technology (what equipment to use?)
5. Developing Legal Sales Channels (i.e. whom to sell to?)



Additionally, there remains the question of the longer term sustainability and scalability of the model developed in this pilot project. This topic is addressed in its own section below.

These issues are considered in greater detail below.

3.4.1 Location

While the issue of site selection was already addressed in the initial consultations, that exercise was geared towards identifying and selecting larger mining zones, each with hundreds of pits and perhaps thousands of miners. These zones were the target of the second, Enumeration Phase.

The issue at hand for the Mechanisation Phase is the selection of specific constrained sites (in practise, likely single pit or series of tightly grouped pits), within the previously identified larger zones, where the work of technological outreach can take place. The sites chosen for the mechanisation phase will have to meet a few basic criteria:

- One-day journey from Kisangani
- Reasonable population of diggers and reasonable level of gold production
- Reasonable level of security

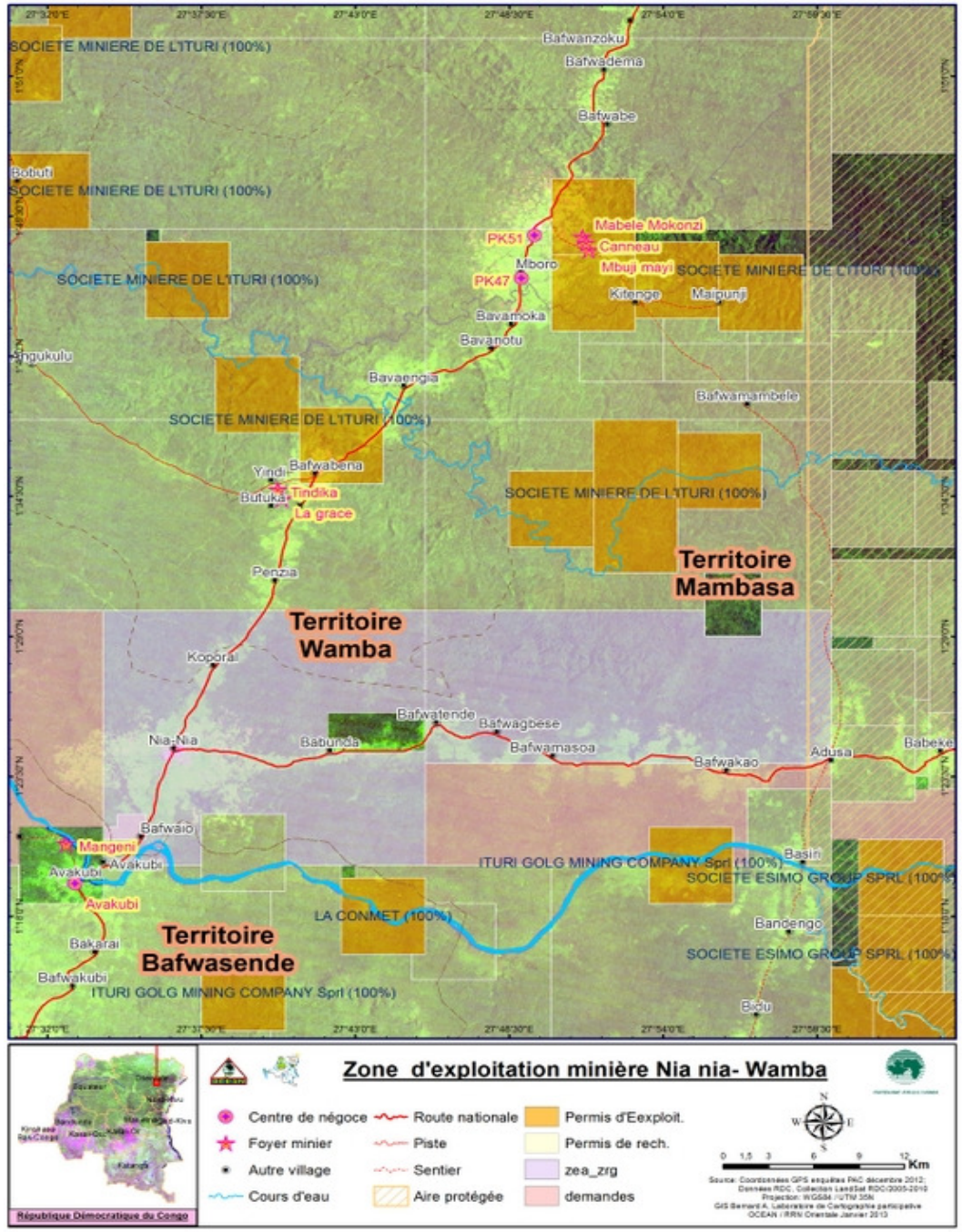
The requirements for digger population and gold production already formed part of the selection criteria for the larger working zones, and thus have already been met for the four main areas that form the target of the Enumeration Phase (see List of Maps for maps of these four areas)

The one-day journey criterion results from the need to transport mechanisation equipment to and from the mine site, and more importantly from the need to facilitate access to the site by the technology specialist who will teach miners how to make use of this equipment. While one could require the technology specialist to come to the mountain, rather than the other way around, the project budget is sufficiently tight as to strongly discourage the wasting of expensive specialists' days on transportation.

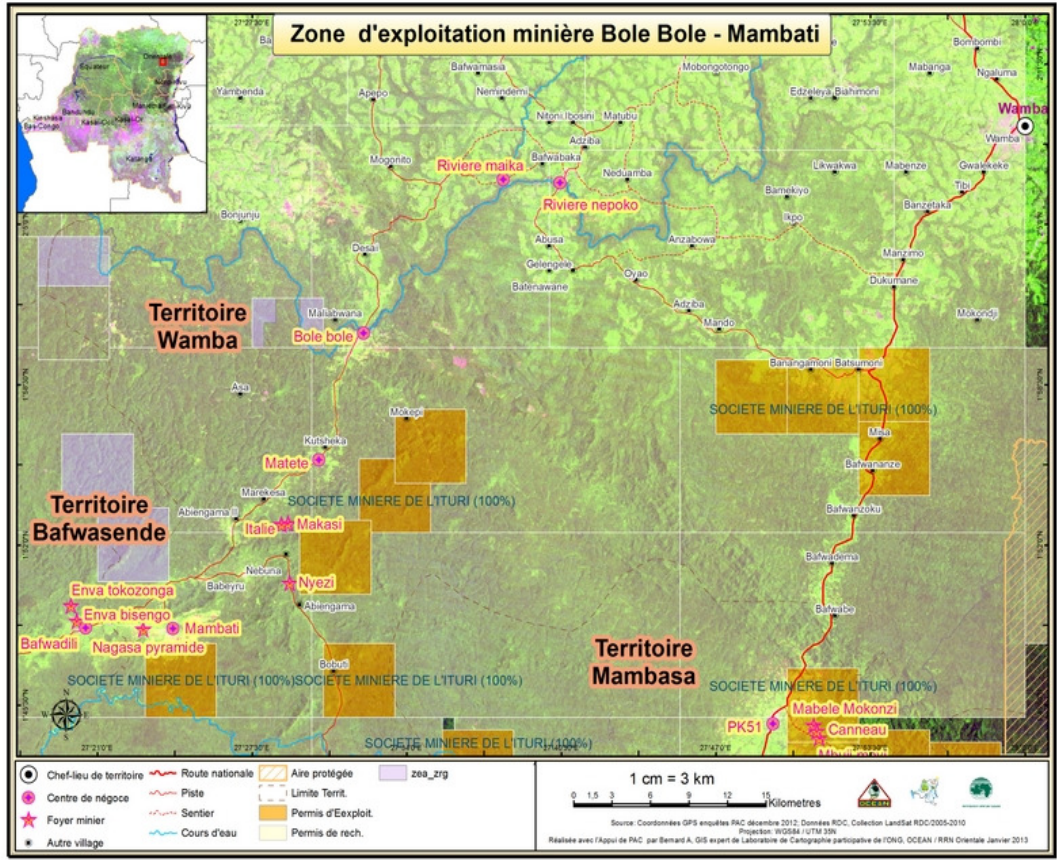
Keeping the mechanisation sites within a one-day's radius of Kisangani will also greatly facilitate the evacuation of conflict free gold produced in the pilot phase. In addition, closer proximity to the project's regional headquarters in Kisangani should facilitate close oversight of the mechanisation phase by the in-country project manager.

The one-day journey requirement ruled out the Bole Bole to Mambati access (Map 2) as well as the mining zone to the east of Bondo (Map 4)

The areas remaining for consideration include the Mangi mining area, a recent gold strike with some 80 pits and upwards of 4000 miners, located some 120 km kilometres north and west of Banalia (see Map 3), and the Nia-nia to Wamba axis, likely somewhere close to the *centre de négoce* at PK51 (see Map 1).

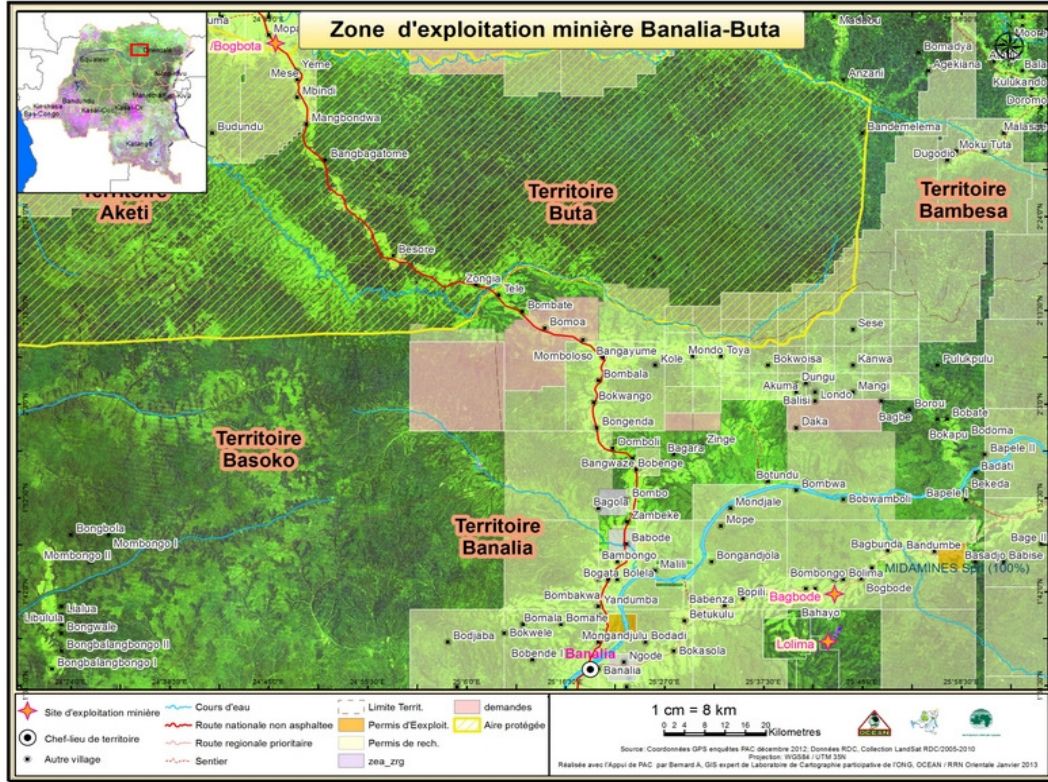


Map 1: Nia-Nia - Wamba Corridor, including PK51 (Cadastré Minier de la RDC (CAMI), PAC and OCEAN, January 2013)



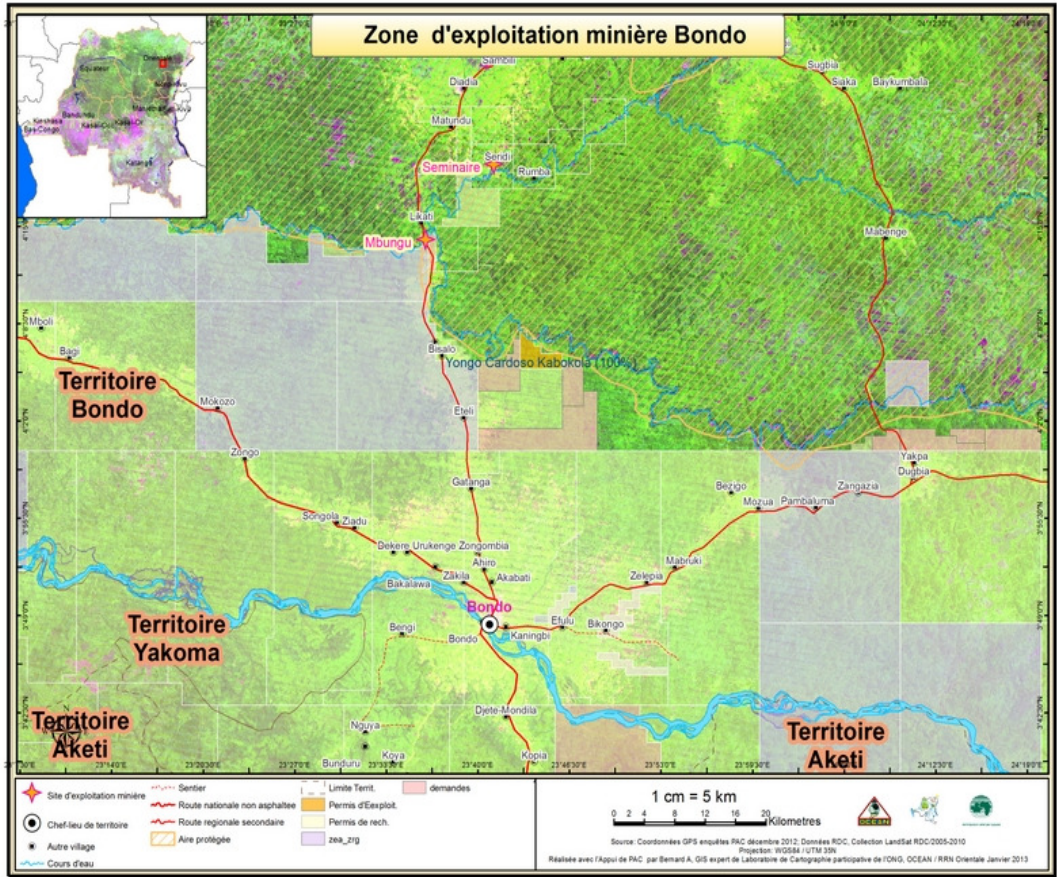
Map 2: Bole Bole- Mambati Corridor
(Cadastre Minier de la RDC (CAMI), PAC and OCEAN, January 2013)






Map 3: Banalia-Buta Corridor, including Mangi
(Cadastré Minier de la RDC (CAMI), PAC and OCEAN, January 2013)





Map 4: Bondo Corridor
(Cadastre Minier de la RDC (CAMI), PAC and OCEAN, January 2013)





In terms of security, the Mangi area is as safe as mining areas get in the eastern DRC – it has experienced no problems with Mai Mai incursions since the end of the civil war (2005); FARDC incursions are sporadic and limited to light extortion.

The PK51 area is still a question mark when it comes to security. The entire Nia-nia to Wamba axis is located adjacent to the Okapi forest reserve, which has served in recent years as the base of operations for Mai Mai leader, Morgan Sadala. However, during the spate of attacks unleashed by Morgan Sadala in early 2013 this corridor remained untouched (despite attacking the city of Mambasa and mines along the Mambasa-Beni corridor). This restraint provides hope the PK51 area could serve as a test site, though conditions will obviously have to be re-evaluated before any commitment to install a mechanisation test site in the area is made

Depending on funding and budgeting specifics, the project could proceed with one or more sites in the Mangi area, or one or more sites at both Mangi and PK51.

3.4.2 Mining Partners (whom to work with?)

Technological outreach lies at the heart of the Mechanisation Phase. And while the project could simply provide equipment and training to individual miners, it is unlikely that there would be any return on that investment in terms of legal gold sales. Having received the equipment, miners would more than likely revert to their regular sales channels.


In order for the technological outreach to generate the desired results, the project requires a structure on the ground that can enforce the basic bargain underlying the program (i.e. equipment for legal sales). Two options are possible: a miner's cooperative or association of some kind, or the AFM (*Administrateur de Foyer Minier*) organisational system.

AFM Option

The advantage to the AFM system is that it is already in place. An AFM is present and exerts authority at practically every dig site. At some sites, the AFM is the site owner; more often, he has been put in place by the owner as a kind of local site manager.

The degree to which the AFM directs mining activity varies greatly from one site to another. At some sites, the AFM lets diggers get on with work on their own, ensuring only that they pay a percentage to the owner, either in the form of a production percentage or weekly rental (in gold), or more often in the form of *liwanza*, labour services for 1-3 days of the week. At other sites, the AFM organizes and directs all digging activities. This is particularly true on those sites where the ore vein is located at some depth or in difficult material (i.e. rock) and a substantial investment must be made by the owner in removing overburden or otherwise accessing the gold bearing ore. At these sites, diggers are paid a food allowance and work until the gold vein is made accessible. At this point, they are most often allowed to work the site on their own, in return for a higher percentage (in gold, rental or *liwanza*) than they might pay at a more accessible site, where initial investments are lower.

The AFM then has the ability to organize and direct work, and to require and enforce adherence to an agreement or contract. All this are useful characteristics for a mechanisation partner.



The disadvantages to working with or through an AFM are both practical and ideological. Ideologically, AFMs and owner stem from the better off class of artisanal producers. Assisting them is in effect providing help to the already prospering.

On a practical level, there is some concern (voiced in particular by field workers with CENADEP, with long experience of artisanal mining in the region) that AFMs might not reliably stick to an agreement with an NGO. That is, AFMs would be more likely than diggers to accept the technological assistance and then renege on the agreement to sell through legal channels. That said, enforcing the basic bargain will be a concern no matter who is chosen as an eventual producing partner. (The structures required to facilitate adherence to the basic bargain are discussed in Section 3.4.3 below)

Miner Cooperative or Association

There are currently no miners' cooperatives or other similar organisations in any of the gold mining areas identified in Phase 1. The only way to work with a miner's coop, then, would be for the project to help create one.

This is potentially feasible. CENADEP, one of the Congolese NGOs involved in the project, has significant experience in helping to organize diamond miners into cooperatives. Indeed, one CENADEP sponsored diamond cooperative is active in the Banalia area, close to the Mangi gold mining site. CENADEP's estimate is that it would require approximately one month worth of field work (outreach, organization, etc.) in order to help miner's at a particular site to organize themselves into a legal cooperative. (Follow-up supervision would of course be required to ensure the cooperative remains on track. This is covered in Section 3.4.3, below)


The advantage of working with a cooperative is that the technical assistance would be delivered to artisanal producers directly, thus benefitting the most needy of the artisanal population. In addition, an artisanal digger's cooperative may be more likely to responsibly honour the basic agreement underlying the project.

As this is a pilot project, with an explicit goal of trying out new approaches, it seems appropriate that the project should attempt to engage with one of each mining partner. That is, the project should work at one site with an AFM structure, and at another site through a miners' cooperative. At the termination of the pilot project, an evaluation can be made as to which structure has proved the most promising.

3.4.3 Enforcement of the basic agreement (technical support for conflict free sales)

The premise of the pilot project is that a basic agreement can be established with the producer partners, such that the project provides technical know-how and equipment in return for the producers undertaking to sell their augmented production only through approved channels (i.e. only to approved, legal *négociants*).

In order to enforce this agreement, PAC or its NGO partner could negotiate and sign explicit written agreements with our producing partners (i.e. the AFM and/or Coop) precisely specifying the responsibilities of both parties: PAC will provide training and equipment, but only so long as the producer can provide proof (likely sales receipts, submitted on a weekly basis) that those using the equipment are selling some minimum quantity of gold to the approved *négociants*. If our partners can't meet this threshold, PAC takes back the equipment.



The producing partner (i.e. coop or AFM) would in turn loan out the equipment to individual teams of miners, again with the same proviso: equipment in return for proof of legal sales. In the case of these loans, it might be better to make it a daily transaction (i.e. daily loan of equipment against daily proof of legal sales)¹

For this system to work, of course, PAC would have to maintain a credible threat to withdraw its equipment in the case of non-compliance. To facilitate this, a depot could be constructed or rented at each of the mechanisation pilot sites. This depot would be used to store and guard mechanisation equipment.

Secondly PAC plans to employ a site representative, whose job it will be to oversee the distribution of equipment, and verify levels of conflict free gold sales. These agents will work full time on site for the duration of the pilot phase, thus ensuring compliance with the basic agreement.

3.4.4 Choice of Appropriate Technology (what equipment to use?)

The exact technology chosen will depend on the specific site, taking into consideration factors such as transportation, infrastructure, local geology, existing equipment and production methods, the needs and requests of producing partners, the level of organization present at the site, and numerous other factors.

In the initial project conception, technological outreach was envisioned in terms of semi-mechanized technologies such as shaking tables or the portable motor driven jigs in common usage in Brazil. However, further field research has revealed the shortcomings of this approach. The capital requirements to acquire a jig or other semi-mechanized technology, and more importantly the logistical and financial requirement to operate a jig are beyond the capabilities of rank and file diggers in the DRC, and would likely pose a steep, perhaps insurmountable challenge even for the typical *Adminstrateur de Foyer Minier* (AFM)

The technology put into play will thus have to be more low tech. Currently, miners in the region use iron spikes (in place of pickaxes), sluices made of hollowed logs with tangled roots for a lining, plastic water buckets for mining pans. In a few places, motor driven pumps and mills (rock crushers) are in use. The photos below show a typical exploitation process, in this case from the Mangi mine area north of Banalia.

The appropriate technological level to improve on this process should be close enough to current technology for miners to understand and adopt, while still offering a significant increase over their current levels of productivity. Technologies under consideration include barrels to provide a steady flow of water for sluices, better sluices, sluice linings, hand-cranked centrifuges for final gold concentration, pickaxes. More advanced sites should be able to make use of motor-driven water pumps and mills (rock crushers). Final decisions on technology will be made during the Mechanisation Phase itself, in cooperation with miners, local partners and appropriate outside specialists.

¹ Determining a reasonable daily or weekly production figure will require some detailed calculations, and will depend on the grade of the gold deposit, nature of the equipment and size of the team. Currently, for example, a four man team at Mangi using water buckets and tree bark sluices produces about half a gram a day. With improved equipment, that production should increase. It would thus seem reasonable to set a minimum legal sales volume at that site at somewhere near 0.5g per 4-man team per day.









3.4.5 Developing Legal Sales Channels (whom to sell to?)

Proper development of the preceding four elements should, if all goes well, lead to the production of small but significant quantities of conflict free gold from one or more production sites (see Section 4.3 below for production estimates). In order to bring this gold to market, the project will have to establish a legal sales chain, one that extends from mine site to artisanal miner to a field based *négociant* located in close proximity to the mine site, and thence downstream to a DRC gold exporter (likely based in Kisangani) and a gold buyer (or buyers) located overseas.

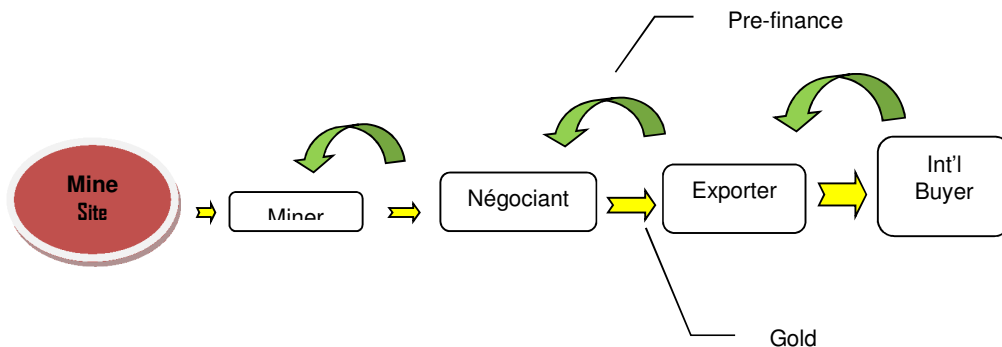



Figure 1: The gold sales chain for Eastern DRC, including upstream flows of pre-finance funds

The sales chain will have to reliably and verifiably transport conflict-free gold from the mine site out to the international market. At the same time, this chain will have to provide a flow of credit upstream. In particular, the clean sales chain will have to replicate the pre-financing function of the standard (clandestine) marketing chain, through which exporters (or *négociants*) provide short term credit to artisanal producers in return for a guaranteed portion of the miners' resulting production.

For interested overseas purchases of DRC conflict free gold, the question is where to insert themselves in this chain. In principle, an interested international buyer could simply by-pass the DRC exporter, and attempt to purchase gold directly from the conflict-free miner and mine sites, by-passing both DRC exporters and the field based *négociants*. This is more complicated than it seems, however. Leaving aside the issue of pre-finance, *négociants* provide a useful service of aggregating small quantities of gold (typically 0.1-0.5g) into larger parcels (200g-1kg) and then transporting this gold from a distant mine site to an export point such as Kisangani. Given that the work of a *négociant* involves spending weeks at a time in challenging field conditions of a DRC artisanal mine, it is doubtful that an international buyer could effectively replicate this aggregating function.

Conceivably, an interested overseas buyer could insert itself in the chain at the point between *négociant* and exporter, taking on the role of a country-level exporter by purchasing gold from (approved and conflict free) *négociants* and exporting that gold from the DRC to clients (likely itself) overseas. An overseas buyer willing to pursue this course would have to set up a DRC subsidiary, and obtain all the requisite permits and licenses. Strictly from the view of purchasing and evacuating gold, an insertion into the sales chain at this point seems entirely feasible. The difficulty comes with the provision of pre-finance.



Nearly all miners, and many *négociants*, work on some kind of pre-finance arrangement. *Négociants* advance small sums of money (or food and equipment)² to miners, in return for a pledge that the miners will sell their gold only to that *négociant*. The *négociant* recovers his advance directly from the gold sales, and earns what is in effect interest by purchasing the gold at a rate slightly below that offered to ‘non-pledged’ sellers (sellers who haven’t received loans).

Négociants, meanwhile, quite often work with money advanced by an exporter. The arrangement here is similar to that described above: the exporter loans money to a *négociant*, who in turn buys gold with the borrowed money, which he pays back by sales of gold to the exporter-lender. The exporter earns some interest on his loan, but more importantly secures a steady supply of gold.

For both *négociants* and miners, the ultimate source of advanced funds is the exporter. And while the sums at risk³ are not large, the challenge for an outsider in taking on this role lies in evaluating the credit-worthiness of potential borrowers, and enforcing payback on the loan.

Négociants live much of the time in mining camps, which allows them to evaluate the character of potential borrowers and the quality of the gold deposit under exploitation. The *négociants* near constant presence in the mining camp also allows him to verify that the miner is not selling his gold to any other *négociant*. Even so, some loans are not paid back, and some miners break their agreement by selling their gold elsewhere. One of the challenges to making a living as a *négociant* lies in factoring the value of these defaults into the cost of the loan.

Exporters, when advancing funds to *négociants*, must engage in a similar exercise in evaluating character, and setting the terms of the loan is such a way as to cover defaults while still allowing the *négociant* to make money (and thus encourage a steady flow of gold). This too is a fairly sophisticated exercise, requiring personal knowledge of the *négociant*, knowledge of local gold mining conditions, and established local credibility.


Certainly, in the artisanal diamond marketing chain, which has a similar structure of sales and pre-finance, attempts by aid agencies to take over the pre-finance role exercised by *négociants* and exporters have generally not met with success.

One of the main challenges is that, to ensure loan repayment from *négociants*, the main coercive tool exercised by exporters is the threat of denial of future credit. This works only in a situation where *négociants* believe the lender is likely to be a long term player, and so are averse to cutting themselves off from a potential long-term source of credit. Where *négociants* know or believe the lender is unlikely to remain, they see no downside in renegeing on loans. A pilot project, by its very nature, falls into this latter default-prone category.

Given the above, it is PAC’s considered opinion that the best place for an interested overseas buyer to insert themselves in the conflict-free chain is at the position shown

² Typically, a *négociant* will advance enough to keep a mining team working for some set period of time, most often a month, sometimes only a week. The *négociant* may advance cash. More often, he will advance supplies – food and sometimes tools. The sums are small, by international standards. A team of four miners might receive the equivalent of \$500 to keep them working for a month.

³ As noted above, \$200 to \$500 would be a typical loan from *négociant* to miner. \$500-\$2500 would be a typical loan from exporter to *négociant*.



at Figure 1, just downstream of the existing DRC exporters. The overseas buyer would become the ‘conflict-free gold’ customer of an existing Kisangani-based exporter. While this does leave two layers of existing middle-men in place, it also frees up the international buyer first from the necessity of establishing a legal subsidiary within the DRC, and secondly from the challenging task of mastering the intricacies of artisanal pre-finance. Indeed, such an insertion leaves much of the existing sales chain intact.

Setting up this simplified sales chain will involve facilitating business contacts between those international buyers with an interest in conflict-free gold and one or more of Kisangani’s legal gold exporters. The two sides can then work out amongst themselves the specific details of their own business arrangements.

Certainly, the Kisangani exporters should be eager to obtain a new, respectable overseas client. They have an incentive to collaborate because they too are losing out to the clandestine sales chains that exit via the DRC’s eastern border. For similar reasons, the association of field *négociants*, FECODI – already partners in the project through the enumeration phase - should also have a strong reason to collaborate in this new conflict free chain.

PAC’s role in this new conflict-free sales chain will be first to ensure that gold produced at the conflict-free pilot sites gets channelled into the chain, and secondly to provide pilot-scale traceability of this gold. To ensure the former, those Kisangani exporters who are participating in the pilot will station their designated field *négociants* at or near the pilot dig sites. As part of their participation in the pilot project, miners will be informed that they will be required to sell their gold (and obtain pre-finance) only from these *négociants*. (Given this semi-monopoly situation, the participation of more than one exporter, and thus more than one *négociant*, would be a useful check on price-gouging).

The *négociants* will provide the diggers with receipts for all purchases of conflict-free gold. These receipts will be used to justify the miners’ continued use of PAC’s equipment. In addition, the receipts will serve a pilot-scale traceability function. Essentially, the balance of receipts over a certain period (a week, a month) will represent the amount of legally produced conflict free gold which the overseas buyer can purchase from a particular exporter.



Five Issues for Mechanisation Phase		
Issue	Aspects to Consider	Suggested Solutions
Location (which sites?)	One-day journey from Kisangani Reasonable population of diggers and reasonable level of gold production Reasonable level of security	Mangi site (Banalia region, approx. 8 hours north of Kisangani - see Map 3) PK 51 site (Wamba-Niania axis, 10 hours east of Kisangani - see Map 1) Security for PK 51 remains an issue
Mining Partners (whom to work with?)	AFM structure is in place, exerts authority over worksite Miners' Coops would have to be created, but are potentially more likely to adhere to project structures	Attempt two pilot sites, one partnering with AFM, the other partnering with a miners cooperative
Enforcement of the basic agreement (technical support for conflict free sales)	Project needs to establish credible method	Employ a project officer at each test site; agent will establish an equipment depot, ensure that equipment made available only to those miners complying with project requirements
Choice of Appropriate Technology (what equipment to use?)	Appropriate technological level should be close enough to current technology for miners to adopt while still offering a significant increase over their current levels of productivity.	Examples include steady flow water barrels, better sluices, sluice linings, hand-cranked centrifuges for gold concentration, pickaxes, motor-driven water pumps and mills (rock crushers) Final technology choices will be made in cooperation with miners, local partners and technology specialists
Developing Legal Sales Channels (i.e. whom to sell to?)	Sales chain must channel conflict free gold from mine to overseas buyer Chain must also channel pre-finance (credit) upstream to négociants and miners; pre-finance a complex task requiring local knowledge and credibility	International buyers should partner with existing DRC exporters Project will ensure pilot gold channelled to conflict-free négociants and exporters, and provide 'pilot-level' traceability

4. Estimates of Gold Production, Purity, Prices

Table 1 (at end of report) shows estimates of gold production, purity and prices for some 20 mine sites located within areas targeted by the pilot project. The sections that follow discuss some of the aspects of the data found in Table 1, as well as implication of these data for the pilot project.

4.1 Weights and Prices:

The system of weights for purchasing artisanal gold in the DRC is based on two common but out-of-circulation coins from the Mobutu epoch and a wooden matchstick broken exactly in half. These units are known locally as a tige (matchstick), sengi (smaller coin), and a gram (larger coin).

In the field, it is accepted that a tige is 1/10 of a gram, a sengi half a gram and a 1k coin is equal to a gram. In reality, these weights differ significantly from their accepted values. A sample of these weights obtained in the Banalia region and measured with an electronic balance⁴ yielded the following results:

Unit	gram	Difference from gram measure	Notes
tige	0.084	-16%	(based on 10 x 0.084g=0.84g)
sengi	0.714	43%	(based on 2 x 0.714g = 1.428g)
gram	1.28	28%	(based on 1 x 1.28g)

Clearly, there's a significant difference between the coin-measured heavy gram and a standard international gram⁵. Confusingly, miners, *négociants* and exporters all use the term "gram" when referring to this "heavy gram". This confusion may well be deliberate. Miners frequently update themselves as to current international prices for gold, and compare it to what they receive from *négociants* and exporters. While the unadjusted price for a "heavy gram" often comes in at only 3-5% below the international (LBMA) price for pure gold, adjusting heavy grams to real grams reveals a much larger mark-up.

Table 1 shows the "heavy gram" price, the adjusted price based on actual grams and ore purity, and the relationship of that price to the LBMA figure. While miners in the field believe they are receiving something very close to world market price, making the appropriate adjustments shows that the true field price on offer is actually anywhere from 24%-44% below LBMA.

Given the distortion that the system of heavy weights brings to DRC pricing, one technological outreach tactic that would conceivably assist miners would be to provide them with their own more reliable system of weights, or perhaps electronic scales, and insist on a changeover to a system of standard international grams. Considering the advantages the slanted system of weights offers *négociants* and exporters, however, it's likely that such a proposal would encounter significant resistance.

⁴ Tanita Digital Scale Professional Mini, Model 1230

⁵ Note that throughout this report, "gram" refers to the recognized international measure. Where heavy grams are used, they are so indicated



4.2 Purity

Gold purity is difficult to estimate in the field in the DRC. While miners can generally quote a figure for the purity of gold extracted from their site, it should be noted that neither miners nor field *négociants* have the capacity to measure purity on site. The numbers reported by miners have been given to them by a *négociants*, who in turn received them from exporters, who routinely perform a purity analysis before each purchase.

As shown in Table 1, the purity for artisanally produced gold in the pilot project areas ranges from 80%-97%.

4.3 Production Estimates

Estimating artisanal gold production is a challenging task for a number of reasons. Reliable government statistics simply do not exist, which leaves interviews with miners themselves as the primary source of data. These, however, suffer from various distorting factors: miners tend to under-report production (at least to nosy outsiders); production varies greatly over time, and miners consequently have difficulty reporting an accurate average; the number reported by a miner is more likely to reflect last week's results, rather than a long term average.

With these constraining factors in mind, Table 1 shows production figures for some 20 mine sites visited by PAC researchers within the targeted areas⁶. The figures in this table derive from interviews with the AFMs (site bosses), and reflect their estimates of the total number of miners working that site, and the site's total gold production. Total production was then divided by number of miners to achieve a per miner per day production figure (in standard grams).

As shown in Table 1, these vary from a low of 0.03g/miner/day to a high of 0.51 g/miner/day. Taking the sum of miner populations for all sites for which there are production figures (6870 miners) and dividing by the production for those sites (1182g) yields an average figure for all miners across all 20-some mine sites of 0.17g/miner/day.

This 0.17g figure is consistent with interviews conducted with individual miners and mining teams. Several teams of four miners reported total team production of a sengi or half a (heavy) gram per day, which when divided by four works out to 0.18g/miner/day⁷, almost exactly the global average. Other miners reported their daily take of gold as one or two tiges⁸ (0.085g-0.168g), which is also broadly consistent with the global average.


4.4 Production Estimates for the Pilot Phase and Beyond

As currently envisioned, the pilot project envisions beginning outreach work at a minimum of two distinct mine sites, one directed by an AFM, the other by a miners' cooperative. The mine site at Canneau (Mangi), listed below in Table 1, would be a

⁶ The four mine sites in the Mambasa area are no longer part of the target area, due to Mai Mai activity in that zone. The production data from these sites has been maintained in the table in the interests of increasing sample size, and thus increasing accuracy of results. The research visits to these sites were conducted prior to the Mai Mai flare up.

⁷ 1 sengi = 0.714g

⁸ 1 tige = 0.084g



typical candidate. The site is worked by approximately 80 miners, mining in teams of 4-6 people, using a mix of mining pans and primitive sluices. Production at Canneau, as listed in Table 2, is 0.16g/miner/day, extraordinarily close to the global average of 0.17g/miner/day.

The project envisions increasing miner production via the provision of technical assistance. To arrive at a conservative estimate of the likely gold production of the pilot phase, it will be assumed that no increase in productivity will result; that is, production will continue at the global average of 0.17g/miner/day.

Assuming 80 miners at Canneau and a six-day work week, production at this one pilot site would thus be some 350g/month⁹. Assuming the second pilot site was broadly similar to the first, total pilot phase production would amount to 700g/month.

For international gold buyers, this is a miniscule amount of gold. However, it should be recalled that the pilot phase is designed to show proof of concept. When and if this is successfully accomplished, there is the potential for a very quick ramp up to significant levels of gold production. The Canneau site, for example, is one of some 50 sites located in close proximity to one another in the Mangi mining area north of Banalia. Assuming that all 50 sites are broadly similar yields a mining population of 400 and a monthly production of 1767g of gold.

Within the targeted pilot areas, Table 1 shows the mining population of those sites actually visited by PAC researchers. The total number of miners at these visited sites¹⁰ comes to 3500 miners, for a monthly gold production of some 15.5 kg.

As the enumeration phase is showing, however, the number of sites PAC was able to visit during the research phase is but a fraction of the total. The first enumeration mission, completed April 6, 2013, collected data from nearly 2000 miners located in just one of the targeted areas. The Phase manager estimates that by the end of the enumeration phase, some 10,000 miners will have been enumerated. Gold production from this population would amount to some 44kg per month, or somewhere near half a tonne a year. This should be sufficient volume to warrant the interest of international buyers.


5. Longer term sustainability/scalability

This pilot project exists to show proof of concept: namely, that given the proper incentives artisanal miners can be persuaded to sell their gold through legal channels. As the above analysis shows, even if successful, the pilot will capture a bare 1.5% of the potential gold production in the identified project areas in Western Orientale. The challenge then lies in ensuring the sustainability of the project over a longer time period, and in scaling the project up so that it encompasses a far larger portion of Orientale's gold production.

Sustainability and scalability both hinge on introducing new elements that fit already within the existing artisanal gold paradigm, and on finding domestic players who have a natural interest in taking over and extending the interventions introduced during the pilot.

⁹ 80 miners X 0.17g/miner/day x 6 days/week * 4.33 weeks/month

¹⁰ Leaving out those in the Mambasa corridor, now off limits due to security concerns



As designed, the Mechanisation Phase sticks pretty much within the existing framework of artisanal exploitation. The sole exception to this is the miners cooperative. Cooperatives do not have an excellent track record in artisanal exploitation environments. Those coops that do succeed are based not on sharing revenue, but rather on group effort to secure some common resource (often mining title). As this coop will exist solely to distribute equipment – and not to share mining proceeds – it has a reasonable chance of success.

In terms of sustainability, the ideal would be for the producing partner – the AFM or coop – to take over the distribution of the mechanisation equipment. While the pilot project does not plan to charge miners for equipment use (proof of legal gold sales will be sufficient), over the longer term some nominal fee will likely be required to defray the costs of maintenance and new acquisition. The small amount charged would pay for coop operating costs, and maintenance/repair of the equipment.

The concept of equipment rental (equipment in return for something) is well understood by DRC artisanal miners. At some sites already, pumps can be rented for a small amount (one tige) of gold per day, while mills can be used for a percentage of the processed rock. PAC would maintain ownership of the equipment, and the written contract would remain in force. Theoretically, PAC could deny usage of the equipment if sufficient legal sales targets are not met.

Scalability lies in finding domestic actors with an incentive to extend and expand the interventions initially sponsored during the pilot project. The logical candidates for this would be the legal gold exporters, backed (and perhaps motivated) by overseas gold purchasers. Exporters have the capital to pay for new purchases of mining equipment, and a strong incentive to capture gold production that currently exits clandestinely via Uganda. Additionally, the concept of advancing funds in return for guaranteed sales is already well established. The addition of technical support would be merely a small additional step.

Some outreach would of course be required for gold exporters to understand and take on this new role. In addition, the presence of international and local NGOs in the mine sites might be required for some limited time frame (12-18months) in order to mid-wife the new tech support for gold sales paradigm, but the potential for independent adoption of this new legal way of doing business is there.

In terms of verifying legal gold sales, and tracing the gold from mine to point of export, this is legally and naturally the role of SAESSCAM, the DRC's government agency for supervising small scale mining. Unfortunately, there remains a great well of distrust among artisanal miners towards SAESSCAM. It might thus well be necessary, as an interim measure at least, for SAESSCAM to partner with Congolese civil society groups in fostering and developing legal gold chains.

This type of partnership between DRC civil society and DRC mining agencies is already a feature of the Enumeration Phase, where it has worked extremely well. Only very moderate funding levels (Congolese NGOs tend to be far less costly than internationals) could secure local NGO participation and monitoring of conflict free gold sales, thus providing a needed level of assurance to both DRC miners and international purchasers. Potentially then, should the pilot project provide the needed proof of concept, only very moderate levels of outside investment – much of it private sector driven - would be required to expand legal and conflict-free gold sales to encompass a plurality, or potentially even a majority of artisanal production in Western Orientale.

Region	Mine Site Name	GPS Coordinates		No Miners	Prod g/day	Prod /Miner g/day	Purity	Research Date	Gold Price	Gold Price (100%)	Variation from LBMA
		N	E						CF/heavy gram	US\$/g	
Nia Nia	Mangeni	01°20'51,1"	027°32'39,4"	20	1.28	0.06	97%	Jan 2013	42000	\$37.17	-31%
	Tindika	01°34'46,0"	027°40'13,4"	20	10.24	0.51	94%	Jan 2013	33000	\$30.14	-44%
	La Grace	01°34'23,4"	027°40'22,2"	170	6.4	0.04	94%	Jan 2013	38000	\$34.71	-35%
Wamba	Mabele Mokonzi	01°44'41,2"	027°51'06,9"	1600	512	0.32	85%	Jan 2013	35000	\$35.35	-34%
	Mbuji Mayi	01°44'10,4"	027°51'20,2"	100			96%	Jan 2013	35000	\$31.30	-42%
	Canneau	01°44'26,6"	027°51'14,3"	40			96%	Jan 2013	35000	\$31.30	-42%
Bole Bole-Bafwadili	Enva bisengo	01°48'55,3"	027°20'07,2"	40	10.88	0.27	90%	Jan 2013	43000	\$41.02	-24%
	Enva tokozonga	01°49'32,7"	027°19'52,1"	100	12.8	0.13	90%	Jan 2013	43000	\$41.02	-24%
	Nagasa pyramide	01°48'34,7"	027°22'54,7"	100	64	0.64	87%	Jan 2013	44000	\$43.42	-19%
	Makasi	01°52'52,6"	027°29'00,2"	400	64	0.16	90%	Jan 2013	39000	\$37.20	-31%
	Italie	01°52'49,9"	027°28'44,1"	100	64	0.64	80%	Jan 2013	30000	\$32.19	-40%
	Nyezi	01°50'28,0"	027°29'04,4"	40			80%	Jan 2013	32000	\$34.34	-36%
Mambasa	Tokoloke	01°16'04,1"	029°07'49,3"	50	6.4	0.13	95%	Jan 2013	45000	\$40.67	-24%
	Mokoli Echange	01°13'18,4"	029°07'25,4"	1000	256	0.26	98%	Jan 2013	37000	\$32.41	-40%
	Carmel	01°07'41,3"	029°09'33,7"	1000	51.2	0.05	96%	Jan 2013	48000	\$42.93	-20%
	Kotakoli	00°54'00,5"	029°18'00,0"	1500	64	0.04	97%	Jan 2013	41000	\$36.29	-32%
Banalia-Buta	Canneau (Mangi)	02°09.498'	025°42.464'	80	12.8	0.16	96%	Mar 2013	40000	\$35.77	-30%
	Lumbo			450	13.7	0.03	86%	Mar 2013	40000	\$39.93	-22%
	Seminaire	04°19.137'	023°41.129'	140	19.2	0.14	80%	Mar 2013	35000	\$37.56	-27%
	Canana	04°19.824'	023°40.787'	100	12.8	0.13	88%	Mar 2013	40000	\$39.02	-24%

Table 1: Gold Production and prices at sites within targeted work areas in Orientale Province, DRC.

(Parameters used to calculate table: Heavy gram to gram: 1.28; Troy ounce to gram: 31.1035; Average LBMA price for Jan 2013: \$1671/troy oz; LBMA price for March 2013: \$1593/troy ounce)