Case Study Briefings

for
Africa Regional Course in Environmental Assessment and Environmentally Sound Design ▪ Kabale, Uganda ▪20–24 May 2002

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Notes and cautions:
These case study notes have been generated based on information that is sometimes conflicting or incomplete. If any participant has information that corrects or presents another picture of the situation, please inform the course facilitators and the case study working group as soon as possible.

During the discussions with stakeholders, please avoid raising any expectations (or fears) that additional funding or development activities will be forthcoming in the project area.

These notes are NOT exhaustive. They are intended to be a starting point for field data collection and subsequent analysis by participants,.

Sources and acknowledgements.
The following sources were used in construction of these case studies:

1. Raussen, Ebon and Musiime. “More effective natural resource management though democratically elected, decentralized government structures in Uganda.” *Development in Practice* Vol 11 no 4 (August 2001). Pp 460-470.
2. Siriri, Zake, Raussen and Teynwa. “Crop and soil variability on terrace benches in the highlands of Uganda” (manuscript in publication)
3. Saito, KA, F Bagoora, T Busisa, D Mutazindwa & S Namara. *Final Evaluation of Africare’s Uganda Food Security Initiative1997–2001 (PL 480 Title II Monetization Program in Uganda).* Africare/Uganda. December 12, 2001.
4. Raussen, Siriri, and Ong. “Trapping water, producing wood and improving yields through rotational woodlots on degraded parts of bench terraces in Uganda” in *East African Agricultural Forestry Journal* 65(2) pp 85–93.
5. Siriri, David and Thomas Raussen. “The agronomic and economic potential of tree fallows on scoured terrace benches in the humid highlands of Southwestern Uganda” (manuscript in publication)
6. Lindblade, K., G Carswell and Joy Tumuhairwe. “Mitigating the Relationship between Population Growth and Land Degradation: Land-use Change and Farm Management in Southwestern Uganda” in *Ambio* vol 27 no 7 (Nov 1998) pp 565-571.
7. *Agroforestry Trends* (AFRENA–Uganda Project Newsletter). 1999 & 2000.
8. field notes, case study preplanning survey. April 2002

Background Information: Kabale district and environs

Environment

The case study sites are all located within Kabale District of southwestern Uganda, within 1.5 hours' drive of Kabale itself. Information about this area of Uganda is provided here. It is applicable to all case studies.

Topography and Climate: Kabale District lies in the highlands of southwestern Uganda, centered on approximately 1º15'S 30ºE.

Elevation ranges from 1220 to ~3000 m on moderately rugged terrain comprised of "broken mountains, scattered Rift Valley lakes, deeply incised river valleys, steep convex slopes of 10–60º, and gentle slopes of 5–10º adjacent to reclaimed papyrus swamps." (1, 2).

The area possesses a highland temperate climate (mean maximum temperature is 23ºC; mean minimum temperature is 10ºC) with bimodal rainfall averaging 1000–1500 mm year.

Soils: The predominant soil types are ferralitic sandy clay loams (2). Valley bottoms are characterized by deeper soils with higher proportions of silt and/or peat. Generally high original soil fertility has declined due to continuous cultivation and cultivation practices (see "smallholder cultivation practices and food security," below).

Water. As a result of its upper Rift valley geology, the district does possess numerous springs. Three percent of the district is covered by water, with Lake Bunyoni, a large highland lake, being the dominant water body.

Vegetation and ecosystem zones. Originally, the southwestern Uganda highlands were heavily forested, with papyrus wetlands dominating the valley bottoms. However, heavy agricultural use and high population density (see socio-economic section, below), have resulted in almost complete displacement of original forest ecosystems with agricultural, woodlot, and pasturelands. (Exceptions are protected forest. Note, however, that the case studies do not involve protected forest/national park areas.)

The upper slopes of hills and hilltops are often occupied by grassland or scrub. In almost all cases, these lands were originally forested, and then cleared for cultivation. They have been allowed to go fallow due to declining soil productivity, the dominant cause of which topsoil loss.

Wooded areas are in almost all cases managed woodlots, with Eucalyptus predominating. The fraction of indigenous trees is negligible. (This is not a recent phenomenon, but has been the case for at least a half-century.)

The area is characterized by numerous wetlands in the valley bottoms. While wetlands are now protected by national law, significant wetland conversion has occurred in recent years.

Wildlife: Few, if any sizable indigenous grazers or predators remain in the area. Small mammal populations do exist. Cattle are dominant grazers, followed by goats and sheep.

Socio-economic

Population. The total population of Kabale district is approx. 600,000, of which approximately 90% is rural. This corresponds to very high population densities of 250–350 persons/km^2. Household fertility stands at the national average (equivalent to annual population growth of approximately 3%); however, *net* population growth for the district is below the Ugandan national average due to substantial out-migration of families and working-age individuals, particularly men. This out-migration is driven in substantial part by scarcity of arable land.

Household characteristics. Many households are woman-led, as men have often migrated to seek work (though this pattern varies significantly by village). Average household size is 5–6 individuals.

Economic and subsistence activities. Smallholder farming is by far the dominant economic and subsistence activity. (See “smallholder cultivation practices and food security,” below.)

While in absolute terms water is relatively abundant—and, due to the numerous springs in the area, often of relatively high quality, women often spend significant time (3–4 hours/day, on average) fetching water.

Kabale district is in persistent fuelwood deficit with; fuelwood is frequently a significant household expenditure. Crop residues and dung are frequently used as cooking fuel; the traditional “3-stone fire” is the dominant cooking technology.

Road infrastructure and market access. Overall road service to rural communities is poor, but improving, in significant part due to donor activities. The majority of road kilometers are “community roads,” for which maintenance responsibility resides with the community. As of the late-1990s, many community roads were impassable by automobile due to lack of maintenance, with significant adverse impacts on access to markets and services. The district, which is ap. 2000 km^2 in extent, possesses ap 700 km of feeder roads (district-maintained), and ap. 60 km of tarmac roads.

Health. The area’s temperate highland climate and relatively abundant water limit the impacts and incidence of many tropical diseases.

However, the area has high incidences of malnutrition and related diseases, particularly among children:

> *In South-western Uganda, a combination of high reates of repeated illnesses, certain cultural beliefs, inadequate health services and poor sanitation have resulted in several manifestations of malnutrition. Prevalance of malaria fever among the under-fives in Kabale stood at 36.4% in 1997. Stunting of children under five was at 47% (Kakitahi, 1997). Diarrhea was highly prevalent and sanitation was poor. Most families reportedly ate meat only at festive occasions. Despite the inadequate nutrition data collected for the district, it is clear that malnutrition has been endemic. Women and children were most affected and it was easy to come across children suffering from Kwashiokor, night blindness and marasmus. Other forms for malnutrition like goiter (both clinical and sub-clinical), protein-energy malnutrition (PEM) and aneaemia were also prevalent. ((3), p 86)*

Malnutrition results in part from calorie deficit, but substantially from protein and vitamin-deficits.

Smallholder cultivation practices and food security

Dominant crops. Sorghum, sweet potatoes, maize, beans, and peas are the dominant crops on the slopes. Valley bottomland is typically used to cultivate vegetables and potatoes (the dominant cash crop), and for dairy farming. Utilization of improved varieties is relatively low. Woodlots, in which Eucalyptus dominates, are also managed as cash crops, producing fuelwood and building poles.

Landholdings. Household landholdings are highly fragmented, with the average household holding ap. 1 hectare split into multiple non-contiguous plots.

Farm labor. Women provide the large majority of farm labor in this area, due to out-migration of men and cultural work practices. Male labor is substantially focused on cattle and cash crop production.

Cultivation methods and soil fertility.[1] High population densities have resulted in intensive cultivation of available land. As noted above, the original dense forest of this highland area has been almost completely displaced by cultivation; cropping on slopes of more than 20% is not uncommon. Tillage is by hand.

[1] This description of cultivation practice and the causes of terrace fertility gradient are taken from sources (2) (4) and (5).

Slope cultivation is typically carried out on terraces, ranging in width from 5–15m, and with internal slopes of 5–10%. Terracing was an erosion control measure implemented in the later 1930s and 1940s by colonial authorities. Note that terraces do not have retaining walls; erosion control is provided primarily by vegetation of the exposed face of the terrace riser.

Terraces typically exhibit a pronounced fertility gradient, with the upper 40% of the terrace contributing ap 10% of total yield, and the lower 40% contributing ap. 70% of total yield (2). In some cases, the upper portions of terraces are abandoned, as low yields do not justify the investment of seed and labor.

Improved seed storage

The fertility gradient is linked to “terrace scouring,” in which erosion and tillage practices tend to pull topsoil from the top of the terrace towards the bottom (farmers typically face upslope when tilling, thus tending to pull soil downslope). In addition, the terraces were originally created in large part by pulling soil downslope. As a result, the upper gradient of most terraces is characterized by a much thinner layer of topsoil—or frequently consists simply of exposed subsoils.

These exposed sub soils are characterized by poor physical soil structure which restricts root penetration and water conductivity. by low levels of soil nutrients and a poor soil physical structure (high compaction and clay content, low organic carbon) restricting root penetration and water conductivity. If physical structures are improved, fertility in the upper terrace zone exhibits a strong response to the addition of nitrogen.

This is not to say that the lower portion of terraces are undegraded. There are indications that these sections of terraces suffer from potassium and phosphorus deficiency. Many farmers report declining fertility even in lower terrace sections; this is particularly true on upper portions of hillsides (below). (Sorghum, a staple crop, tends to uptake potassium. When crop residues are not returned to the soil, this results in potassium depletion.)

The fertility gradient does not occur only within terraces. Hillsides as a whole typically exhibit a significant fertility gradient, with hilltops and upper terraces frequently being so degraded that they are left fallow. This reflects the fact that terraces are an imperfect erosion control measure. Surface runoff can spill over the lip of the terrace and run down the riser. In addition, some farmers deliberately pull more fertile soil down from the upslope terrace. This practice destroys the terrace risers. Terrace integrity is best preserved and soil movement restricted when contour hedges are employed. However, these are not yet common practice.

Soil amendments. Inorganic fertilizers are little used due to income constraints. Manure and crop residues are used in a limited way, particularly in plots close to homesteads. However, crop residues are also used for animal fodder, a use which often takes priority. There is net nutrient removal from most plots.

Processing and storage. Africare’s baseline survey for its Uganda Food Security Initiative found that crop and seed “storage facilities are non-existent or in disrepair and preservation methods are antiquated. The incidence of pest infestation is high” (3). Seed potatoes, in particular, require special storage facilities to avoid rot.

CASE STUDY 1: Community-based watershed management for flood and erosion control

Assignment.

Participants will conduct an environmental review of a *hypothetical* proposed project to implement community-based watershed management for flood and erosion control in Kabale district.

The purpose of the project is to increase long-term shelter and food security for the inhabitants of the lower watershed area.

The participants will study the AFRENA Kyantobi Village/Katagata River Catchment project as an *example* of such a project. Participants will also view AFRENA agroforestry field experimentation plots to understand the soil conservation/restoration techniques being employed. However, this exercise is **NOT** intended to be a critique of the specifics of the AFRENA interventions, but a review of the environmental issues associated with projects of this type, and in this general environment.

An environmental review of the proposed project requires evaluation of the baseline situation in the area, and an evaluation of how the proposed project would affect this baseline.

In this case, the project's economic and social benefits would derive *directly* from environmental improvements and conservation measures. (See "potential environmental issues, below."). For this reason, the Environmentally sound design principle that environmental effects of a project be considered *together* with the project's economic and social effects is particularly appropriate.

Participants will therefore be expected to carry out a survey of the existing environmental, social and economic conditions and trends in the project area (the baseline), noting those conditions and trends that are likely to be affected by the project area activities.

Following the case study site visit, the participants will prepare an environmental review report for the case study and, an environmental mitigation and monitoring plan that is appropriate to the type and level of impacts that are likely to be caused by such a project.

The review will be presented to the rest of the group for discussion in plenary.

Overview of the Kyantobi Village/Katagata River Catchment project[2]

Structures and fields in valley bottomland are always at risk of floods during heavy rains. This risk increases very substantially when slopes are deforested and/or erosion control structures are inadequate or poorly maintained. In such situations, little rainfall will be retained on the slopes and runoff will be even heavier, taking with it large amounts of topsoil. The result is vastly decreased fertility up-slope, and destructive flooding in the valley bottom leading to loss of crops, structures and sedimentation of bottom-land soils.

Kyantobi village, situated at the lower end of the Katagata river catchment, experienced precisely this set of events in the heavy El Nino rains of 1997–98.

Crops in valley bottomlands, with a view of upslope areas

[2] This section is drawn primarily from sources (1) and (8).

Via their local council, representatives of the village contacted AFRENA (Agroforestry Research Networks for (East and Central) Africa. (AFRENA was known as an extension services provider under NAADS, the National Agricultural Advisory Services effort).

AFRENA realized that effective intervention in the 1000 ha watershed would require coordinated community action throughout the watershed. Not only were the numbers of smallholders too large for AFRENA to work with directly, but holdings were so fragmented that control of erosion on one slope would require the actions of many smallholders.

An MOU was signed with local councils for joint implementation of erosion control measures, principally contour hedgerows and woodlot fallows of abandoned upslope terraces (contour hedges were identified by farmer delegates who were taken by the project staff on a one-day study tour to on-station and on-farm research sites.

AFRENA worked with villagers in a participatory mapping exercise to identify run-off "hot spots" (slopes which were the source of particularly severe run-off) and to map out ownership of plots on key slopes. "Hot spot" slopes were the first targeted for contour hedgerows; plot ownership was used to establish responsibility for hedgerow planting and to calculate the number of hedgerow seedlings that each farmer would need.

Monitoring flume

Abandoned terraces have been targeted for the planting of woodlots. Participants will visit AFRENA field demonstration plots to gain a better understanding of woodlot fallowing techniques and contour hedgerows. Woodlot fallowing with indigenous tree species has the potential to rehabilitate depleted up-slope and up-terrace soils while producing fodder, fuelwood, and building poles. Beneficial effects result from mobilization of subsoil nutrients, root penetration and soil loosening, nitrogen-fixing, and addition of organic carbon via leaf litter. (4, 5)

AFRENA has established 3 flumes to monitor stream flow and water quality in the catchment and is currently in transition to community-based monitoring, AFRENA believes they are seeing significant water quality improvements and stream flow moderation in the watershed.

Potential Environmental issues.

Again, an environmental review of a proposed "Community-based watershed management" scheme for flood and erosion control must consider BOTH:

- the baseline situation or status quo. That is, local environmental conditions, and the environmental effects of traditional agricultural practices and land uses; and
- the environmental effects of the hypothetical project compared to this baseline.

Environmental issues in the baseline situation. The environmental baseline situation is defined here as a profile of the current environmental conditions in the watershed—both its upper slopes and lower catchment areas—and the present and reasonably foreseeable impacts of current smallholder agriculture and settlement patterns on these conditions. Many of the basic issues are outlined in the "Background information" and project overview sections above.

A degrading or dangerous baseline situation motivates the project. As noted, the baseline situation affects *both* valley dwellers and those who live and cultivate up-slope. Indeed, loss of upslope fertility may result in increased exploitation of valley bottoms.

Environmental effects of the hypothetical project. Clearly, a project of this nature is intended to deliver social and economic benefits that derive directly from improvements to a deteriorating environmental baseline. Thus, the nature of these improvements are of *critical concern* to the project. The environmental review should document these anticipated benefits.

Further, the environmental benefits of the project must be sustained over the long-term for the project to achieve its goals. Specifically, this means that moisture retention/erosion control measures AND land use management controls must be maintained.

Thus, in this case, the environmental review should identify mitigation measures to *assure continuity of project benefits*. Mitigation measures should also address the possibility of adverse impacts (e.g., greater exploitation of valley bottomland) and long-term environmental sustainability concerns. These are issues not just of design and implementation, but also involve social organization to ensure long-term maintenance.

CASE STUDY 2: Integrated soil conservation and agricultural productivity

Assignment.

Participants will conduct an environmental review of a *hypothetical* integrated agricultural project making heavy use of agroforestry techniques for farm-level soil conservation and improvements in income and diet.

The purpose of the project is to increase long-term food security of beneficiaries. Food security includes resiliency to poor growing seasons, as well as calorie, protein and nutrient sufficiency in the everyday diet. Food security also requires preservation of long-term soil productivity. As the background information section illustrated, soil productivity is at particular risk in Kabale district due to a combination of topography and cropping practices.

The participants will study certain aspects of Africare's Uganda Food Security Initiative (UFSI) as an *example* of such a project. However, this exercise is **NOT** intended to be a critique of the specifics of the Africare project, but a review of the environmental issues associated with projects of this type, and in this general environment.

An environmental review of the proposed project requires evaluation of the baseline situation in the area, and an evaluation of how the proposed project would affect this baseline.

The environmental baseline situation is defined here as a profile of the current environmental conditions in the project area, and the present and reasonably foreseeable impacts of current smallholder agriculture and settlement patterns on these conditions. As the background section indicates, this baseline is deteriorating or at risk with respect to basic support of agricultural productivity.

Thus, the project's economic and social benefits would derive in large part from environmental improvements and conservation measures. (See "potential environmental issues, below."). For this reason, the environmentally sound design principle that environmental effects of a project be considered *together* with the project's economic and social effects is particularly appropriate.

Participants will therefore be expected to carry out a survey of the existing environmental, social and economic conditions and trends in the project area (the baseline), noting those conditions and trends that are likely to be affected by the project area activities.

Following the case study site visit, the participants will prepare an environmental review report for the case study and, an environmental mitigation and monitoring plan that is appropriate to the type and level of impacts that are likely to be caused by such a project.

The review will be presented to the rest of the group for discussion in plenary.

Overview of Africare's Ugandan Food Security Initiative (selected aspects)

Beginning in 1997, Africare/Uganda undertook a five-year, USAID Title II-funded, integrated food security project. The project, focused in Kabale district, is now entering its second phase.

The project had five activity areas: (1) soil conservation and erosion control ; (2) community roads; (3) agricultural production and post-harvest handling; (4) community nutrition, and (5) strengthening the organization and capacity of farmers, institutions and associations. The need for increased food security in the area is evident from the background section, above.

The focus of this case study are the farm-level soil conservation and erosion control interventions on agricultural land (erosion control interventions were also a part of the community roads activity;

community roads are the subject of case study 3). However, participants will see that agricultural soil conservation and erosion control were closely linked with other elements.

Under the general heading of soil conservation and erosion control, Africare undertook to promote a number of activities, practices and technologies via community-based participatory approaches:

- Tree hedgerows to stabilize contour bunds and terrace risers, using seedlings grown in community nurseries. These hedgerows employ both upper-storey and understorey trees, as appropriate. Hedgerows provide co-benefits of fodder, fuelwood, and building materials.
- Energy-saving cookstoves
- Farm manure proecution and applications
- Erosion control trenches, ditches

It is interesting to note that the final three activities were seen as very important to the final project results, but were not part of the original activity design. They can be seen as both reinforcing measures and mitigations needed to assure success of the agroforestry activities.

Before visiting UFSI villages and households, participants will first visit AFRENA field test/demonstration plots to better understand many of the agroforestry interventions promoted by the project.

Potential Environmental issues.

Again, an environmental review of proposed soil conservation schemes for small holder agriculture in this area must consider BOTH:

- the baseline situation or status quo. That is, local environmental conditions, and the environmental effects of traditional agricultural practices and land uses; and
- the environmental effects of the hypothetical project compared to this baseline.

Environmental issues in the baseline situation. The basic environmental issues of the baseline situation are outlined in the “Background information” section above. This indicates that the environment’s ability to support agricultural productivity is at risk. This deteriorating baseline—and its social effects—is in many ways the motivation for the UFSI.

Potential environmental issues associated with a proposed project. An integrated agricultural project like this one is intended to stabilize or improve a deteriorating environmental baseline situation, and thus provide the foundation for sustainable improvements in agricultural productivity. Thus, significant environmental benefits are expected to result from the project, and these benefits are tied directly to social welfare. The environmental review should document these anticipated benefits.

Further, the environmental benefits of the project must be sustained over the long-term for the project to achieve its goals. Specifically, this means that moisture retention/erosion control measures and agroforestry and other practices must be maintained.

The environmental review should identify mitigation measures that (1) ensure continuity of project benefits; (2) account for any potential adverse impacts (e.g., high dependency on a few agroforestry species); and (3) acknowledge long-term environmental sustainability concerns. These are issues not just of design and implementation, but also involve social organization to ensure long-term maintenance.

CASE STUDY 3:
Community road construction

Assignment

Participants will conduct an environmental review of a *hypothetical* project to construct a *new* rural access road in Kabale district using a combination of heavy equipment and manual labor.

The purpose of the project is to increase access to markets (thus increasing income generation options and incentives for rural farmers), reduce the cost of agricultural inputs, and provide better access to social and extension services. (For these reasons, community and feeder road improvements are a key part of Uganda's poverty alleviation strategy.)

The participants will study rural access roads constructed by Africare's Ugandan Food Security Initiative. If time permits, the participants will also view recent roadwork undertaken by Krone (U) Ltd. This work rehabilitated a road traversing a wetland to provide heavy truck access to a wolfram (tungsten) mining site.

However, this exercise is **NOT** intended to be a critique of the specifics of either the Africare or the Krone (U) Ltd. Roads. Instead, it is intended to be a review of the environmental issues associated with projects of this type, and in this general environment.

An environmental review of the proposed project requires evaluation of *both* the baseline situation in the area, and an evaluation of how the proposed project would affect this baseline.

The environmental baseline situation is defined here as a profile of the current environmental conditions in the project area, and the present and reasonably foreseeable impacts of maintaining a roadless condition.

Environmentally sound design further requires that environmental effects of a project be considered *together* with the project's economic and social effects. Thus, the environmental impact assessment process requires gathering and analyzing social and economic data.

Participants will thus be expected to carry out a survey of the existing environmental, social and economic conditions and trends in the project area (the baseline), noting those conditions and trends that are likely to be affected by the project area activities.

Following the case study site visit, the participants will prepare an environmental review report for the case study and, an environmental mitigation and monitoring plan that is appropriate to the type and level of impacts that are likely to be caused by such a project.

The review will be presented to the rest of the group for discussion in plenary.

Overview of Africare community road activities

Community road construction and rehabilitation has been a key activity in Africare's Ugandan Food Security Initiative (UFSI) project. (Community roads are the lowest tier of the Ugandan road network; so named as responsibility for maintenance of these roads lies with the community.) Africare's road projects come from a list of priority road segments identified by District government; the UFSI project has reconstructed or rehabilitated more the 120 km of such segments.

Community roads were prioritized at the start of the UFSI primarily because the poor condition of the community road network in the District left rural populations isolated from regional markets for significant portions of the year.

As the UFSI Final Evaluation Report notes:

> *"…road construction in Southwestern Uganda is complicated by the steep slope of most road beds and high rates of soil erosion from adjacent agricultural areas, which contribute to the normal erosion*

associated with roads. Another complicating feature is the area's extremely high population density, which exacerbates the normal problems of finding compensatory landholdings for populations displaced by road construction."

Africare employed a participatory approach in its road efforts, including local governments and local communities directly. Consultations included: road placement decisions; obtaining the necessary right of way and compensatory land allocations; obtaining road construction materials; road construction/ rehabilitation labor; drainage structure construction and maintenance labor.

An EIA was conducted for the community roads activity. The EIA set out mitigation measures and practices; participants should be able to observe these practices in implementation, or as reflected in the design of road.

Participants will view at least two Africare community road segments.

Looking downslope on a newly cut Africare community road

Krone (U) Ltd mine access road

Time permitting, participants will also view a section of road rehabilitated to allow heavy vehicle access to a wofram (tungsten) mining site being reopened by Krone (U) Ltd. This road passes through a number of steep gradients and traverses a wetland. Addition of ap 1 m of fill on top of the former cross-wetland roadbed was in progress at the time the case study survey was undertaken in April (photo). Participants should compare construction techniques on this road to those undertaken by Africare.

Like Africare, Krone (U) Ltd negotiated with local communities regarding the road work and procured much material locally.

In travel to the Krone (U) Ltd access road, participants will pass by a small-scale lava ash mining site (photo). The site illustrates many of the issues associated with borrow sites for road materials.

In addition, of course, participants will pass over a significant amount of district feeder and community roads. This will provide opportunities to assess the longevity of drainage structures, the. In addition, the participants will see several examples of wetland encroachment and conversion (principally to cash crop Irish potato cultivation) undertaken close by to roads. This raises clear questions regarding the role of roads in facilitating non-sustainable use of these areas.

Excavation of roadbed material from hillside for cross-wetland traverse

Executing projects under Ugandan EIA procedures:
Kabale Water Supply and Sanitation Project

Because roads are frequently major construction projects, they more commonly fall under Ugandan EIA requirements than other activities undertaken by course participants.

For this reason, participants in this case study will have the opportunity to tour a major construction project subject to EIA requirements and mitigation measures. This is the rehabilitation and expansion of the Kabale water supply and sewerage system. Information regarding this project is appended to this case study.

Lava ash mining

Participants should pay particular attention to the connection between the EIA and the management of this major construction project.

Potential Environmental issues.

Again, an environmental review of any activity must consider BOTH:

- The baseline situation or status quo. That is, local environmental conditions, and the environmental effects of agricultural practices and land uses in the absence of a road.
- The environmental effects of the hypothetical project compared to this baseline.

Environmental issues in the baseline situation. The basic environmental issues of the baseline situation are outlined in the “Background information” section above.

Potential environmental issues associated with a proposed project. Roads deliver many social and economic benefits. However, roads can also pose a number of serious environmental issues, particularly in an environment like Kabale district.

In particular, a poorly designed or constructed road, or one in which drainage structures are improperly maintained, can *significantly worsen* erosion and soil degradation. Roads function as natural conduits for water, and can channel significant flow to a single point when drainage structures fail. Participants will see a number of examples of erosion gulleys arising from poor road drainage en route to the site.

Maintenance of drainage structures is particularly problematic after an organization leaves the project site, or even after the road-construction phase of the development program is finished..

In addition to aggravating soil loss via drainage failures, new roads also provide access to previously inaccessible areas. This may facilitate activities such as cultivation or charcoal making. These activities may lead to deforestation and wetland conversion unless well-controlled.

CASE STUDY 4:
Commercial mining and area development

Participants will conduct an environmental review of a *hypothetical* project to develop a mining operation in Kabale district, focusing not simply on the potential environmental impacts of the mining operation, but on the effects of this operation on social and economic conditions in the project area, and on the secondary environmental effects brought about by social and economic changes.

For the private firm developing the mine, the purpose of the project is profit.

For NGOs working in the area, such a project presents opportunities to carry out development activities that build on and benefit from the infrastructure development and income generation brought about by the project. Alternatively, NGOs may perceive needs to design activities to mitigate certain negative effects of the project.

It is in the interest of the private sector entity, however, to operate with the goodwill of the community. Thus, there may be opportunities for collaboration between grass roots development organizations and the private developer.

Participants will view the wofram (tungsten) mining site being developed by Krone (U) Ltd as an *example* of such a mining development project. However, this exercise is **NOT** intended to be a critique of the specifics of the Krone project, but a review of the environmental issues associated with projects of this type, and in this general environment.

An environmental review of the proposed project requires evaluation of the baseline situation in the area, and an evaluation of how the proposed project would affect this baseline.

The environmental baseline situation is defined here as a profile of the current environmental conditions in the project area, and the present and reasonably foreseeable impacts of current settlement patterns and small-scale mining activities on these condition.

Environmentally sound design requires that environmental effects of a project be considered *together* with the project's economic and social effects. Thus, the environmental impact assessment process requires gathering and analyzing social and economic data. The community impacts of the project are clearly significant—ranging from infrastructure improvements to local income generation—and participants should pay particular attention to potential changes to the social and economic baseline that may arise due to the project.

Participants will be expected to carry out a survey of the existing environmental, social and economic conditions and trends in the project area (the baseline), noting those conditions and trends that are likely to be affected by the project area activities. NOTE: Participants should focus on the economic effects of the project on the community at large, not on the economic costs and benefits accruing to the developer.

Following the case study site visit, the participants will prepare an environmental review report for the case study and, an environmental mitigation and monitoring plan that is appropriate to the type and level of impacts that are likely to be caused by such a project.

The review will be presented to the rest of the group for discussion in plenary.

Overview of Krone (U) Ltd Wolfram mining project

Krone Ugande Ltd holds a 21-year Wolfram mining concession in Kaara parish, with which it has reopened a long-inactive wolfram mining operation. Some background operation on the operation, and on wolfram mining in general, is appended to this case study.

At the time of the case study survey (April 2002), the company was in the process of rehabilitating the access road to the mine and mill. (See description and photo under rural roads case study.) The road rehabilitation is necessary to bring heavy processing equipment into the site, which will enable a significant increase in production.

Participants will have the opportunity to tour existing operations and be briefed on planned expansion. Note that Krone will be supporting an “outminer” scheme, in which Krone purchases wolfram extracted by existing small-scale (individual) mining activities.

Executing projects under Ugandan EIA procedures: Kabale Water Supply and Sanitation Project

Projects of similar scale to Krone’s wolfram mining project—and particularly mines—almost always require EIAs under Ugandan regulations.

For this reason, participants in this case study will have the opportunity to tour another major construction project subject to EIA requirements and mitigation measures. This is the rehabilitation and expansion of the Kabale water supply and sewerage system. Information regarding this project is appended to this case study.

Participants should pay particular attention to the connection between the EIA and the management of this water and sewerage project.

Potential Environmental issues.

Again, an environmental review of any activity must consider BOTH:

- The baseline situation or status quo. That is, local environmental conditions, and the environmental effects of current trends in settlement and economic activity, including small-scale mining and agriculture.
- The environmental effects of the hypothetical project compared to this baseline.

Potential environmental issues associated with a proposed project. The basic environmental issues of the baseline situation are outlined in the “Background information” section above. Participants should also pay particular attention to evidence of past commercial mining activities (and their long-term impacts), as well as the effects of ongoing small-scale mining operations.

Potential environmental issues associated with a proposed project. Mining clearly has a large number of potential environmental impact, of which management and disposition of tailings is only one.

However, secondary effects may also be significant, particularly if the project stimulates significant in-migration, or if road/infrastructure improvements result in increased exploitation of wetlands or other protected areas (note that the boundary of the Biwindi Impenetrable Forest National Park may be visible in the distance).

The environmental review should identify mitigation measures targeting these secondary impacts. In many cases, these issues might not be addressed directly by the private developer, but form the basis for NGO development interventions.

Facilitator's Instructions and Questions: Roads case

1. Before commencing the field visit, introduce participants to the concepts of camber, ditches, diversion channels/cross drains, culverts, soil types and road improvement materials and equipment used.
2. Also introduce participants to the use of road classification systems.
3. Show participants different classifications of roads. Stop several times and have the groups observe eroded areas and also roads done correctly. Include examples of cambered and uncambered road; road with and without ditches, road with proper diversion channels/cross drains and those without. Discuss the appropriate use of culverts.
4. Review soil types and the use of morum. Show examples.
5. If possible, show the participants examples of small borrow pits used to provide road material. Could borrow pits represent a potential health or safety hazard?
6. What happens if a road is not ripped during construction and maintenance? What happens if runout drains are not provided on sloping surfaces? What happens to a road with more than 8-10% slope. What happens if cross drains are not provided on sloping surfaces? How can these problems be mitigated? Where does the water for compacting come from? How long do surface water diversion channels have to be? How often do they need to be installed? What methods and equipment are used for road maintenance? Where is it cost prohibitive to maintain a road segment(s)? How difficult or easy is it to reduce erosion?
7. To minimize environmental impact when should road work be done? What season? What time of day?
8. Do any of the roads create excessive dust? How could this be minimized? (e.g., reduced maintenance, more curves in the road.) Can the road be engineered to reduce vehicle speeds?
9. What is the correct procedure for "decommissioning" roads which are no longer used or which are being re-located? What is the approximate cost?
10. If possible, point out examples of secondary or tertiary effects from road construction and operation, e.g. stream siltation and gulleying.
11. Did any of the existing roads pass through especially sensitive ecological zones? Did any of the roads have potentially adverse effects on threatened or endangered species?
12. What may be the indirect or cumulative impacts of road improvements in the district?

Planning and design

13. What steps can be taken during design to minimize adverse environmental impacts? Design of road to follow contours? Soil testing? Selection and survey of borrow pit areas? Amounts available and plans for restoration/reclamation of quarry or borrow pit sites?

Construction

14. What equipment and materials will be used to minimize environmental impact and when should road work be done? What season? What time of day?
15. Will realignment/relocation require bush clearing? Any impact on threatened or endangered flora or fauna? Soil erosion? Creation of borrow pits/ Other secondary or tertiary effects such as stream siltation?

16. How can potential construction impacts best be mitigated?

Operation

17. What happens if the road is not ripped during construction and maintenance? How can these problems be mitigated? Where does the water for compacting come from? Implications?
18. Water needs? Soil erosion? Effects on threatened or endangered plants or animals? Dust? Noise?
19. Other secondary, tertiary effects such as stream siltation. Longer-term cumulative impacts?

Decommissioning or Abandonment

20. What is the correct procedure for "decommissioning" those segment of the existing roads which will no longer be used? What might be the approximate cost?

Other questions

21. Who will be responsible for mitigating and monitoring impacts? How often? What will it cost?
22. What is the group's overall assessment of the proposed road improvements? Should they go forward, be modified or dropped?
23. Should there be an overall programmatic environmental assessment for IDP camp road improvements?