

ENVIRONMENTAL ASSESSMENT AND SCREENING REPORT

on the project

Improving Productivity and Market Success of Ethiopian Farmers

Pilot Learning Wereda:

Metema

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ENVIRONMENTAL ASSESSMENT AND SCREENING REPORT

Improving Productivity and Market Success of Ethiopian Farmers Pilot Learning Wereda: Metema,

1. Project Description

The project covered by this Screening Report is the 2006 programme of technology packages being introduced in Metema Wereda, Amhara Region, a Pilot Learning Woreda (PLW) of IPMS Ethiopia that are considered likely to have potential environmental impacts.

The Responsible Authority is CIDA.

The intervention programme concerned consists of five inter-related technology packages to be adopted and disseminated under the IPMS: (i) Minimum/Zero tillage, (ii) Expansion of irrigation potential of the PLW, and (iii) Cultivation with agrochemicals.

The technology packages constitute components of an integrated programme for the PLW, implemented by the local farmers through the wereda agricultural office and facilitated and supported by IPMS. They are screened here as one project for environmental assessment purposes due to the fact that they are to be implemented jointly and their impacts are interrelated and therefore best assessed jointly.

The project is a point project, limited to the geographic extent of Metema Wereda.

It should be noted that other activities for this PLW planned or under consideration, such as introduction of new crop varieties that are accompanied by no significant changes in technology or production method, and no environmental linkages or potential impacts, are not included in the 'project' screened in this Screening Report.

The project activities may be summarized as follows:

1.1 Minimum/Zero tillage

Farming is extensive in Metema. Weeding is a major expense for both large small scale farmers due to high wage rate. There are so many noxious weeds including parasitic weeds such as *Striga*. According to the regional Bureau of Agriculture (BoA, 1997), yields from farms infested by *Striga* could be reduced by about 50% and more. Heavy damage to crop plants is also caused by annual and perennial weeds, mainly of grasses. Among the prevalent weeds *Phalaris* spp, *Digitaria* spp and *Galensoga* spp are dominant in the area. Yield reduction as a result of weed infestation in Metema is very high. IPMS is supporting minimum/zero tillage through the use of less environment damaging herbicides in the area. Labour is very expensive in Metema and hence application of

roundup herbicide is very important in reducing cost of production. Application of this herbicide will be made prior to sowing the major crops (sesame, cotton and sorghum). Fields for sesame will be sown without ploughing, while cotton and sorghum fields will be ploughed only once. All seeds will be covered using donkey pulling a branch of acacia. The pulling of a branch will help protect seeds from being exposed to the sun but also have good contact with the soil and avoid the risk of being eaten by birds.

1.2 Expansion of irrigation potential of the PLW

There are many perennial rivers in Metema. Use of these rivers is still very minimal. The development of irrigation potential through river diversion, use of river beds/pumping for vegetable and fruit production is being encouraged. Use of shallow well will also be encouraged. Temperatures are very high and could reach to as high as 42 °C in which case supplemental irrigation water to these fruits and vegetables become very essential. This is being strongly supported through the wereda OoARD. With the introduction of Cavendish dwarf banana and other improved tropical fruits, IPMS's support of this scheme becomes essential.

1.3 Cultivation with Agrochemicals

Cotton and sesame have been growing for many years in the wereda. These crops, especially cotton, require the application of agrochemicals. However, expansion of sesame will require a more modest use of agrochemicals mainly for sucking insects after harvest.

As a result of increased insect pests and diseases in fruits and vegetables agrochemicals will be used to minimum level. However, efforts will be made to encourage farmers growing vegetables and fruits to use organic insecticides (neem, tephrosia) and fertilizers or minimal artificial fertilizer to the extent possible.

2. Description of Project Surroundings

Metema worda is one of the border towns between Ethiopia and Sudan and is located about 900 km northwest of Addis Ababa. It is about 180 km west of Gondar town. According to the OoARD the total area of the worda is about 440 thousand ha. Much of the worda under acacia dominated forest and grasslands. Total population of the worda is 91,216 people and 15,675 rural agricultural households and about 4,991 urban households. All these figures exclude the newly resettled households. The natives of the area are Gumuz who until recently practice slash and burn and hunting wild animals for their livelihoods. They produce sorghum as the staple crop and remain to be the major food crop in the area. The natives are however reducing in number and have concentrated themselves to few peasant associations. The total number of these natives is around 500

households. Hence much of the area is recently settled by new comers from the highlands.

The altitude of Metema ranges from as low as 550 to 1608 m asl. Nearly all of the land in the woreda is in the lowlands except some mountain tops. Minimum annual temperature ranges between 22°C and 28°C. Daily temperature becomes very high during the months of March to May, where it may be 43°C.

Mean annual rainfall ranges from about 850 to around 1100 mm and is uni-modally distributed. The rainy months extend from June until the end of September. However, most of the rainfall is received during the months of July and August. Rainfall during these months is erratic, combined with the poor workability of most of the soils, farm operations are difficult. Evaporation rates are high in Metema. Erratic and some times shortage of rainfall are the major constraints of agriculture in the woreda. On the other hand, when the rainfall is heavy, waterlogging is another crop production problem. Soils are believed to be relatively fertile because of less intensive farming practices. Consequently, farmers and investors in the area do not apply fertiliser. Farmers in the woreda extensively cultivate sesame, cotton and sorghum and raise mainly goats and cattle.

Metema is one of the woredas where gum and incense is collected. The main specie for incense production is *Boswellia papyrifera*, while *Acacia seyal* and *A. polyacantha* are used for gum production. There are 3 private companies involved in harvesting incense with a capacity of about 500 qt annually. According to the woreda 2004 plan, the potential harvestable gum and incense of the woreda could be 98,000 qt. The area is also known for growing bamboo.

Livestock production is an integral part of the production system. Cattle are exported to the Sudan while goats are mainly used for local market. There is a smallholder milk and butter production system mainly for the local market. Transhumance cattle production system is a common phenomenon with highland cattle moved to the lowlands during the main rainy seasons from June to October in search of feeds. Honey production is another common practice in the Woreda mainly in the forest areas, where there are an estimated 14, 000 bee colonies. Poultry production is also common in Metem, but production is predominantly smallholder using local chicken. There is a huge livestock feed resource in the Woreda and hay making being introduced to some PAs.

Cattle are the main source of draught power, source of meat, and milk production. Theft of cattle is a major problem and animals are sold in the Sudan after crossing the border illegally. However, commercial farmers use tractors for ploughing. Oxen are used to plough fields for all crops and to thresh sorghum, while donkeys are used for transporting produces and water for the smallholder farmers. Livestock from the highlands from neighbouring woredas also bring their livestock in search of feed. This has been reported to cause diseases from the neighbouring highlands and vice versa. There are a number of livestock diseases reported in the area and both the farmers and experts consider them more limiting than feed shortage.

Fauna is limited mainly to the mountainous areas. There is a historic battlefield in the PLW associated with the Mahdists' (Sudan) invasion in the late 1800 where King Yohannes the 4th was killed. A small monument stands close to the border town of Metema Yohannes.

Existing Environmental Issues

The principal environmental issues in the PLW are as follows:

- High temperature is an environmental problem which sometimes enhances crop failures and/or demand a lot more water due to high evapotranspiration.
- Malaria is a major problem that cause illness and affect the work force in the PLW.
- The abundance of different weeds is proving to be a major environmental problem in the PLW.
- Waterlogging is an important environmental problem as a result of the soil characteristics and the amount of rainfall.
- Different livestock diseases as a result of transhumance livestock production system and due to cattle crossing the wereda to go to Sudan.
- Clearing of forest and bushes for settlement and small/commercial farms is common. Incense and gum plants are also cut indiscriminately during this process. In addition many trees are also cut to fulfil energy requirements as charcoal making is becoming a good business because of the relatively abundance of trees.
- Incidence of pests is very high probably as a result of high temperature
- There is a culture of setting fire to the forest and bush lands in order to kill ticks and also encourage new grass growth. During this process essential flora and fauna are destroyed. The incense and gum plants are among the many important plants burned during this process.

3. Environmental Effects and Public Concerns associated with Planned Initiatives

Table (i) sets out:

- Possible negative environmental impacts before the introduction of mitigating measures;
- Planned mitigating measures;

- Expected negative environmental impacts after implementation of mitigating measures.

Notes

- It should be noted new crop varieties will be limited to those produced and approved by government public bodies, notably the Ethiopian Institute of Agricultural Research (EIAR). No varieties involving any form of genetic engineering, or likely to introduce new environmental impacts, will be introduced.
- Expanded cultivation of fruit and vegetables will be accompanied by organic fertilizer and composting programmes, thus producing a positive environmental impact.

Public Concerns

With the introduction of herbicides for minimum/zero tillage, the need for labourers will be substantially reduced or labour price may reduce substantially. This was a social concern with regards to IPMS initiatives in the PLW.

Project Phases

Table (i) relates to the operations phase of the project. There is no pre-construction phase, construction or closure phase. Accidents and malfunctions are covered within the Integrated Pesticide Management (IPM) Plan.

Table (i) incorporates both direct and indirect impacts.

Significance of Adverse Environmental Effects (after implementation of Mitigating Measures)

No significant adverse effects are likely.

4. Mitigation Measures

Technically and economically feasible mitigation measures are set out in Table (i).

Table (i) Matrix of Mitigating Measures and Likely Impacts after taking Mitigating Measures into account

Activities:	1. Minimum/Zero tillage	2. Expansion of irrigation potential	3. Cultivation under Agrochemicals
Likely Impacts before Mitigating Measures	<p>(i) As a result of using herbicides, many farm labourers will be jobless (social impact).</p> <p>(ii) If appropriate herbicides are not used It is possible that there would be a loss of rare flora and fauna. However, if the herbicides are applied and applied before flowering, as is mostly the case, the effect on bees will be very low.</p> <p>(iii) <i>Public Concern:</i> The need for labourers will be substantially reduced or labour price may reduce substantially.</p>	<p>(i) Extensive use of irrigation may result in salinisation and consequent soil encrustation.</p> <p>(ii) River bank erosion partly due to the clearing of land for agricultural purposes</p> <p>(iii) Long term underground water depletion</p>	<p>(i) Uncontrolled or careless use of agrochemicals may pollute the groundwater and rivers resulting in health hazards for human and animal life, and may pose a hazard for bees.</p>
Mitigating Measures	<p>(i) Alternative employment opportunities like collecting incense and gums are available in the PLW. In addition, other farm operations will still need human labour and hence effect is low. Human labour has always been a problem in crop production, even when it was used for weeding.</p> <p>(ii) Herbicides selected for this purpose will be less harmful. The type of herbicides used have shown harmless to bees in the PLW</p> <p>(iii) Enough care will also be made to avoid affecting the wild bee population in the PLW.</p>	<p>(i) Drip irrigation methods will be recommended and encouraged. This will solve problems related to salinity, and long term ground water depletion.</p> <p>(ii) Multipurpose tree species (soil conservation, feed resources, etc.) need to be planted for river bank protection.</p> <p>(iii) Use of drip irrigation and proper agronomic practices (mulching, manure, etc.) will solve this problem</p>	<p>(i) An Integrated Pesticide Management (IPM) plan covering use of a combination of natural methods and agrochemicals will be drawn up and implemented, covering acquisition, application, accidents, storage and disposal of agrochemicals. In addition, the location of use will take into account proximity to PAs dependent on apiculture.</p>
Likely Impacts (after mitigating measures)	After implementation of mitigating measures, no adverse environmental impacts are expected.	After implementation of mitigating measures, no adverse environmental impacts are expected.	After implementation of mitigating measures, no adverse environmental impacts are expected.

5. Cumulative or Interactive Environmental Effects

The following potential long-term cumulative effects could be postulated:

5.1 Reduced labour demand for weeding

If the use of herbicides on cotton and sesame is popular, fields under these crops will be free of weed. As a result, daily wage or number of labourers who seasonally migrate for weeding will be affected. However, there are other opportunities that this labour force could move to, like collecting incense and gums in the PLW. However, the wereda OoARD nor IPMS have no control over this situation. Moreover, it is only the weed labour that may be affected otherwise other crop production operations will still need the labour force, for example, harvesting. Among the crops, sesame is very sensitive because of the shattering effect requiring timely harvest.

5.2 Loss of Flora and Fauna

Uncontrolled adoption of herbicide use throughout the PLW and beyond could lead to a situation whereby the flora and fauna could be reduced. However, this herbicide will be applied to sesame and cotton fields mainly on the private farms, which constitute about 16% of the total crop area in the wereda. This will even be so if all private farmers use this chemical in all their fields. The rest will be covered with sorghum and other crops where herbicide application will not be economical. It has also been reported from the wereda that the herbicide does not affect bee per se. However, other agrochemicals may negatively contribute towards the bee keeping activities in the wereda. Enough care need to be made to avoid the effect of these chemicals on bee population.

5.3. Use of water from river beds

During the dry season, farmers in Metema use water from river beds because most of the rivers dry, during this period. Excessive use of this resource may cause water tables to lower, depending on the magnitude of exploitation, in the long run. Most of the soils in Metema are Vertisols and rainfall is erratic in most cases which enhances waterlogging which may then enhance evaporation due to higher temperatures in the area. However, in the presence of vegetative cover, rain water may percolate and replenish the ground water, as rainfall is relatively higher.

6. Effects of the Environment on the Project

6.1 High temperature

As a result of expansion of small scale fruit and vegetable development in Metema, the most likely effect of the environment on the project would be lowered water tables on a long term basis, if excessively used. This is also aggravated due to high evapotranspiration due to high temperature. It is possible that mulching and use of manure could be encouraged to counter high evapotranspiration problems.

Regarding the depletion of ground water, IPMS and OoARD will monitor this condition so that it is not depleted to the extent that it will affect future users. With regards to river depletion, this could bring about unbalanced resource use between farmers in the upper and lower streams. However, the OoARD and the existing social structures will solve these problems. For both water resources, an environmentally friendly water use techniques like drip irrigation will also be demonstrated by IPMS and wereda OoARD in order to reduce pressure on the under ground and river water. In addition this system will help many farmers to share these resources. Therefore, awareness creation strategies need to be developed in the area.

6.2 Seasonal Waterlogging

As a result of the soil characteristics, high intensity rainfall and topography, crop fields are sometimes waterlogged. This leads to reduced/no production of the major commodities in the PLW. This will consequently affect the income of many farmers but also the foreign currency earnings of the country at large. Metema is the second biggest sesame producer in the country.

6.3 Malaria Incidence

In Metema incidence of malaria, especially immediately after the rains is very high. During this time farm operation are high and require many labourers. The prevalence is so high that highlanders, who come for weeding, harvesting and collecting produce, try to avoid Metema during this period. This has a significant effect on crop production. However, with the expansion of mosquito nets in the wereda it is expected that the incidence will be reduced so that production is not affected. Labour requirements for sesame needs to be optimum because of the shattering effect.

6.4 Wild life (monkey)

Wild life, mainly monkey, is threatening IPMS' intervention on fruits and vegetable production. This is because the area has some trees around many farmlands, especially those around the rivers. Guards with dogs will need to stay around these farms, especially during fruiting time. Other alternative measures will also be considered after consulting the communities.

6.5 Pressure on the environment as a result of extensive rainfed agriculture

Metema is one of the weredas where resettlement is going on. However, this scheme is not considering the long term environmental consequences. As a result of the expansion, many forest areas are being cleared, including the only trees for incense and gum like *Boswellia* species. This is because farming is extensive and land holding per household is large in Metema, relative to the highlands. The wereda administration needs to consider long term negative environmental effects so as to control/minimize these effects. As these newly settled farmers are expected to participate in the project, training will be given on appropriate natural resource conservation measures. Administrators will also be included these training programmes.

7. Nature of Public Participation

There has been extensive public participation in the design of the IPMS interventions in this PLW. The public concern expressed about possible loss of labour force need has been addressed (see Table (i)).

Issues and discussion points provided in public participation workshops were also considered because the writer of this report was part of this process. In addition, most of the information is available in the “*Metema Pilot Learning Wereda Diagnosis Program Design report*”. Other sources of information are also referred to in Section 10 below.

8. Follow-up Program

A follow-up program to ensure that the recommended mitigating measures are implemented as required will be conducted by the staff of the Environment and Natural Resources Unit in the wereda agricultural office, with support from IPMS as required.

9. Relevant Matters

In the project design workshops, it was agreed by the community and the wereda agricultural office that there are no viable alternative means for conducting the project, other than by supporting the Wereda Agricultural Office and the Development Agents (DAs).

There are no transboundary effects anticipated.

10. Sources for the Screening Report

The sources of information used for this Screening Report are as follows:

- The environmental overviews in the IPMS *Project Implementation Report*, March, 2005,
- The IPMS Environmental Framework,
- *Metema Pilot Learning Wereda Diagnosis Program Design*, 23.6.05,
- *BoA (1996). The five year's crop protection action plan (1988-1992E.C) Amhara National Regional State (ANRS) BoA. Bahir Dar 17pp*
- *The Federal Democratic Republic of Ethiopia, Amhara National Regional State, Rural Household socio-economic, Baseline survey of 56 weredas in Amhara region (Phase II), Volume I, Main Document*, Bureau of Finance and economic Development, Bahir Dar, September 2004.
- Consultation with IPMS Project Director and other senior IPMS scientists in Addis Ababa
- Joint PLW environmental reconnaissance by Kahsay Berhe IPMS staff (IPMS Technology/Environment Officer) and Ato Worku Teka (IPMS RDO),
- Consultation with Addis Ababa-based CIDA Environmental Advisor, Ato Tamene Tiruneh,
- Consultation with:
 - Worku Teka (IPMS RDO),
 - Abebe Mulugeta (Metema OoARD Expert, NR Conservation and Development)
 - Tesfaye Mengistu (Amhara BoARD, Expert, Forestry)

All of the environmental issues, likely impacts and recommended mitigating measures presented in this Screening Report were discussed, contributed to and agreed with the Wereda ARD Office NRM staff as listed above, in a group working session on site.

11. Comments/Recommendations

Comments and recommendations to the extent appropriate have been included in Section 9 above.

12. Additional Supporting Documents

None.