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INTEGRATED DEVELOPMENT FOR WATER SUPPLY AND SANITATION

Environmental impacts of rural watsan systems

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THE DEFINITION FOR rural varies widely. Ethiopia uses the population size for classifying population and areas as rural or urban. For water supply purposes a community with a population less than 10,000 is identified as rural. The problems to be addressed and the goals to met in rural water supply and sanitation, in short rural watsan, are quite different (population size, settlement, education, culture, etc.) and requiring different policies (financial feasibility, technical and administrative policies) (Berhanu, 1997a).

Rural watsan systems includes water supply systems - spring boxes, hand dug wells, subsurface dams, sand filters from river and lakes, boreholes, ponds, and cisterns; and sanitation systems - dry pit latrine, poor flush latrine, flush toilet latrine without septic tank, and flush toilet with septic tank and soak pit.

Rural watsan systems share the following characteristics: low in capital costs; use of local materials whenever possible; create jobs, employing local skills and labor; they are small enough in scale to be afforded by a small group of people; they can be understood, controlled and maintained by villagers whenever possible; they make technology understandable to the people who are using it and thus suggest ideas that could be used in future innovations; and they are flexible so that they continue to be used or adapted to fit to changing circumstances. The expected outputs of any rural watsan systems are assumed to be public health benefits, economic benefits, social benefits, community benefits, and environmental benefits.

The need for environmental assessment

The importance of environmental protection and conservation measures has been increasingly recognized during the past two decades. It is now generally accepted that economic development strategies must be compatible with environmental goals. This requires the incorporation of environmental dimensions into the process of development. It is important to make choices and decisions that will eventually promote sound development by understanding the environment functions. The United Nations Conference on Environment and Development (UNCED) in its Agenda 21, Chapter 18: Protection of the Quality and Supply of Freshwater, underscored the importance of environmental protection and conservation of the natural resource base in the context of water resources development.

Rural watsan systems invariably result in environmental changes. Some of these benefit human population, while others threaten the natural resource base. The directives on EIA in the European Union requires rural and urban watsan projects further environmental analysis as they are likely to cause significant environmental impacts and assigns to category B. Also the World Bank indicates that rural watsan projects have to be assigned to the category of more limited environmental analysis as the project may have specific environmental impacts (Berhanu, 1997).

Economic, social and environmental change is inherent to development. Whilst development aims to bring about positive change it can lead to conflicts. In the past, the promotion of economic growth as the motor for increased well being was the main development thrust with little sensitivity to adverse social impact. The need to avoid adverse impacts and to ensure long term benefits led to the concept of sustainability. This has become accepted as an essential feature of development if the aim of increased well-being and greater equity in fulfilling basic needs is to be meet for this and future generations.

An Environmental impact assessment (EIA) may be defined as a formal process to predict the environmental consequences of human development activities and to plan appropriate measures to eliminate or reduce adverse effects and to augment positive effects. EIA thus has three functions: to predict problems, to find ways to avoid them, and to enhance positive effects.

The EIA process makes sure that environmental issues are raised when a project or plan is first discussed and that all concerns are addressed as a project gains momentum through the implementation. Recommendations made by the EIA necessitate the redesign of some project components, require further studies, and suggest changes that alter economic viability of the project or cause a delay in project implementation. To be of most benefit it is essential that an environmental assessment is carried out to determine significant impacts early in the project cycle so that recommendations can be built into the design and cost-benefit analysis without causing major delays or increased design costs. To be effective once implementation has commenced, the EIA should lead to a mechanism whereby adequate monitoring is undertaken to realize environmental management. An important output from EIA process should be the delineation of enabling mechanisms for such effective management.

The way in which an EIA is carried out is not rigid: it is a process comprising a series of steps. The main steps in the EIA process are screening, scoping, impact identification, prediction and mitigation, management and monitoring, and audit. In rural watsan systems the transition from

identification through to detailed design may be rapid and some steps in the EIA procedure may be omitted.

Environmental impacts of rural watsan systems

Watsan projects usually have more positive than negative impacts. There are, however, things to be carefully considered during planning and implementation of the projects. Environmental impacts from rural water supply projects are possible and they are due primarily to the qualitative and quantitative exploitation which occurs as a result of: (i) the abstraction of water (overuse of the resource); (ii)the lifting, storage and distribution of the water; and (iii) the actual allocation made (requirements and mode of use).

As well as the above, there are also possible secondary and tertiary impacts on the environment in the event of increased demand due to positive feedback; overtaxing of the resources due to a good water supply for a short period, accompanied by overgrazing; and gnawing of the vegetation and changes in accustomed modes of use.

The following is an example of checklist for environmental impact assessment for planning, construction and operation of rural watsan systems.

Economic values

Siting of system components
- areas of interest for agriculture, forestry or fishing
- areas of important ground water or surface water resources

Critical value of use of water
- drinking, preparing food, washing dishes, kitchen gardening, agriculture

Critical cost of water supply system
- cost should not be more than the cost of resettlement with water supply in a new place

Cultural values
- Siting of water supply systems
- Nature conservation areas, unique ecosystems, important wildlife habitats
- Areas of unique or exceptional aesthetic quality
- Tourism attraction or recreational areas
- Important cultural, historical, or scientific resources areas
- Areas important for vulnerable human populations
- Schools, hospitals, graveyards, sanctuaries, places of worship, etc.

Environmental impacts caused by the construction of water supply systems

(site selection; site clearance; earth moving; drainage of the site; transport and storage of construction materials)

Environmental impacts caused by the operation of water supply systems

(spring water tapping; ground water abstraction, stream water diversion or regulation; water treatment plant operation; operation of pumping station; overflow and rainwater drainage; use of water points; discharge of waste water; use of access roads; power lines; use of sanitary installations; use of improved water supply systems)

Other environmental considerations related to rural watsan

(water quality in the sources; people's attitudes to water quality; effects of the use and storage of fertilizers, pesticides and industrial chemicals to the water sources; impacts of different uses of groundwater; indirect impacts of the project)

Preconditions for environmental development
- increased environmental awareness
- sectoral cooperation and coordination between different projects planning of activities

Environmental impacts of the construction of rural watsan systems are tabulated in Table 1 (Aulien, 1991).

Environmental policy of Ethiopia

The overall Environmental Policy of Ethiopia goal is to improve and enhance the health and quality of life all Ethiopians and to promote sustainable social and economic development through the sound management and use of natural, human-made and cultural resources and the environment as a whole so as to meet the needs of the present generation without compromising the ability of future generations to meet their own needs (EPA &MoECD, 1997).

Conclusions

Watsan projects usually have more positives than negative impacts. There are, however, things to be carefully considered during planning and implementation of the projects. Rural watsan projects requires more limited environmental analysis as the project may have specific environmental impacts.

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Table 1. Environmental Impacts of the Construction of Rural Water Supply and Sanitation Systems

CONSTRUCTION OF THE SYSTEM COMPONENT	ACTIVITY	IMPACT
SPRING WATER SOURCE STREAM WATER SOURCE GROUND WATER PUMPING	Site selection	- Change in land use
	Vegetation clearance	- Erosion due to removal of protective vegetation - Impact of cultural values
PUMPING STATION WATER RESERVOIR	Earth moving	- Erosion due to unprotected soil - Erosion due to improper drainage - Deterioration in natural landscape in general - Impact on cultural values - Muddy or dusty environment - Turbid water downstream of the site
	Drainage of the site	- Erosion due to improper drainage - Flooding
	Transport and storage of construction material	- Erosion due to water flow along the transportation tracks - Noise and dust due to traffic - Impact on landscape due to storage at areas of special interest
MAIN CONVEYOR LINE DISTRIBUTION LINE	Site selection	- Change in land use
	Vegetation clearance	- Erosion due to removal of protective vegetation - Impact of cultural values
	Earth moving	- Erosion due to unprotected soil - Erosion due to improper drainage and digging arrangement and alignment - Deterioration of natural landscapes in general - Impact on cultural values - Muddy or dusty environment and nuisance on local roads
	Drainage	- Floods to improper drainage
	Transport and storage of material	- Erosion due to water flow along the transportation tracks - Noise and dust due to traffic - Impact on landscape due to storage at areas of special interest
TAP STANDS	Site selection	- Change in land use
	Earth moving, and transport and storage	- Nuisance on local roads due to mud and storage of material on construction material
HAND PUMP WELLS	Site selection	- Change in land use
	Vegetation Clearance, Earth moving and Transportation and storage of material	- Nuisance on local roads due to mud and storage of construction material
	Drainage with petrol driven pumps	- Carbon monoxide and noise during drainage pumping - Erosion and flooding due to improper drainage
ACCESS ROADS	Site selection	- Change in land use
	Clearance of vegetation and Earth moving	- Erosion due to removal of protective vegetation, and open surface - Erosion due to improper drainage, alignment or working procedure - Floods due to improper drainage - Dusty or muddy environment - Deterioration of natural landscape in general - Impact on cultural values
POWER LINES	Site selection	- Change in land use
	Clearance of vegetation earth moving	- Erosion due to clearance of and vegetation and improper drainage - Impact on cultural values
	Transport and storage of material	- Erosion due to water flow along transportation tracks
LATRINES	Site selection	- Change in land use
	Earth moving and transportation of materials	- Nuisance on construction site due to mud, improper drainage and storage of construction material