Ghana-
Agricultural Sector
Investment
Project
EA Category B

Environmental Impact of Irrigation Development & Mitigation Measures
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This report has been prepared by the World Bank
1. Support for irrigation development will be based on the principle of assisting farmers to increase productivity of their presently cultivated farm lands, in the low or marginal rainfall areas of Ghana. The irrigation investment should be operationally and economically sustainable and, for this purpose, would be farmer-owned and managed and appropriate in scale. Where group operation is necessary, the schemes would be restricted to group units of not more than thirty farmers, each farmer managing about one hectare of irrigated crops on land which is already under cropping. A key aspect of the project would be the training of farmers in proper and safe methods of abstracting, distributing and managing the application of water to the soil with due consideration for possible hazards, such as damage to the soil, transmission of water-borne diseases, pollution from chemicals used in crop and soil management practices, excessive abstraction of water from streams and aquifers, or restricting the use of land and water to traditional users and not displacing legitimate users.

2. Except in some areas of the Guinea Savannah region, where some grains are produced in relatively large blocks by individuals using low levels of simple technology, crop production in Ghana is mainly by small farmers with holdings ranging in size from 0.25 to 5.0 ha and applying simple, sometimes very primitive cultural practices under rainfed conditions and relying substantially on labor for all operations, including heading their produce to markets or the nearest motorable road. Many of these practices have long had serious effects on the landscape, such as excessive run-off, periodic abnormal floods alternating with reduced stream flow periods and water shortages, erosion of topsoil, reduction of natural vegetation density and leading to production levels well below land capacity.

3. In the introduction of irrigation to help increase agricultural productivity, priority will be given to measures directed at ensuring sustainability and reversing the current land use malpractices which have contributed to reducing the renewable resources. The following are some
of the environmental factors which would be addressed and where warranted appropriate mitigation practices adopted against risks:

(a) **Disruption of Hydrology.** There will be no additional disruption to the natural hydrology of the rivers. During the peak rainy season, however, there will be a reduction in downstream flood flows and consequent reduction in local flooding and waterlogging of low lying areas, where water conservation practices are put into effect. It should be noted that all rivers are subject to reduced flows in the dry season and, in many instances, they run dry for many months;

(b) **Settlement/Resettlement/Land Compensation.** This is not an issue for this project, since the target areas are already under cultivation, and no settlement, resettlement or land compensation will be necessary. Also, there are no settlements within the catchment areas of the small reservoirs to be rehabilitated or on the lands immediately downstream;

(c) **Encroachment into Forest or Swamplands.** The project will not lead to encroachment into any new forest or swamplands or other ecologically sensitive areas. The irrigable areas have already been cleared and have been used under rainfed farming for many years. As part of the improved management in irrigation agronomic practices, encouragement will be given to restoring some tree species for various economic uses, such as providing poles, firewood, fruits, nuts, livestock forage, etc. These trees would be integrated in appropriate land management practices such as use blocks of woodlots, orchards or windbreaks and shelterbelts;

(d) **Impediments to Movement/Transportation.** The proposed developments will have no impact on movement or transportation in the target areas. Local access roads do not pass through any of the irrigable areas and will not, therefore, require relocation;

(e) **Encroachment on Historical/Cultural Buildings/Areas.** There will be no impact on these as none exist in the target areas;

(f) **Conflicts with Existing Water Uses.** The benefits of conserving surplus rainfall in the wet season could be directed at
irrigation, aquatic wildlife habitat/sources of water for terrestrial wildlife, domestic animals and human consumption, particularly in the dry season. Since all the rivers are seasonal, the small-scale irrigation practices are not expected to have any significant impact on the existing water supply of villagers downstream in the dry months. It is expected that developing water for this purpose would lead to an overall improvement, particularly for watering livestock. Also, the introduction of improved irrigation water management would reduce waterlogging now experienced in some significant areas. Water abstraction from perennial water courses would take into account any downstream users and allowance would be made for ensuring sufficient flow for legitimate riparian user requirements;

(g) Traditional Migratory or Free-ranging Livestock. Free-ranging livestock are occasionally a major problem for farmers, particularly in the dry season, when grazing is poor and animals may be spending more time than usual around valley bottoms and around the reservoirs. Fencing individual plots has been a customary response to the problem. This is costly, time-consuming and takes up useful land. A jointly maintained perimeter fence around the contiguous irrigated areas would be more cost-effective, but requires that the farmers put up capital to purchase the materials. Consideration would be given to incorporating perimeter fencing into the standard project design, making it part of the capital cost of project development;

(h) Erosion Control. There is a risk, albeit small, of localized erosion during rehabilitation and reconstruction of the spillway channels, irrigation channels and control structures. This can be prevented by proper construction procedures that would ensure bank stability and minimum erosion. The management of the irrigated lands will also provide for soil and water conservation measures to ensure maintenance or improvement of the soil fertility and to avoid water-logging and possible salt accumulations;

(i) Suitability of Existing Water Quality for Irrigation. The existing water quality is assumed to be suitable, based on available data on major rivers in the area and based on
existing successful irrigation projects. Agronomic practices to be adopted would be based on optimal chemical applications in soil fertility and pest management to ensure little or no risk of pollution to soil and water. Only small quantities of pesticides would be used and are not expected to cause significant hazards. Arrangements would be made for proper handling, application and storage practices, and only minimum runoff concentrations of toxic chemicals, if any, are likely to occur;

(j) **Water-Borne Diseases.** The main water-borne diseases of significance are guinea worm, bilharzia and malaria. In some places, wells have been drilled, or are being drilled, to improve village water supply and reduce problems with guinea worm. Farmers in irrigated areas would be given advice on simple water filtration methods to guard against ingestion of the water flea which carries the guinea worm eggs into the human body. Bilharzia can be a problem where open lesions on bodies of people become submerged in water infested with the organism. The risk could be minimized by publicizing through extension messages, the measures for avoiding infection. The incidence of malaria is unlikely to be increased with irrigation because, under proper management, free water will not be allowed to accumulate long enough on the soil to allow the breeding of mosquitoes. Any new or rehabilitated reservoirs will be stocked with fish fingerlings to feed on the larvae of mosquitoes which are the vectors of the malaria-causing organisms. Many of the reservoirs soon become havens for crocodiles, which effectively prevent children from getting into the water, and thus reduce the risk from bilharzia and guinea worm infection.

(k) **Wildlife.** The project does not pose any danger to the sparse wildlife population in the area. The main species in the area are crocodiles, snakes - such as black cobras, pythons and grass types, and rodents - such as field rats and mice and grass cutters.

(l) **Vegetation.** The irrigable areas are presently cleared and are either fallow or cultivated. Areas not cultivated for agricultural purposes are generally characterized by Guinea savannah-woodland vegetation or wet tropical forests. The Guinea savannah-woodland vegetation consists of widely-
spaced short fire-resistant deciduous trees (fire climax species) and a ground flora of different species of grass of varying height. The major trees left in the target areas are *Ceiba pentandra*, *Butyropermum*, *Parkia*, *Adansonia digitatita* (Baobab), *Anogeissus*, *Acacias*, and *Blighia sapida*. The composition of the grasslands varies according to soil, situation and conditions of burning and grazing. *Imperata cylindrica* and *Pennisetum polystachyon* occur on arable soils, while large areas of exposed land carry only a thin cover of *Heteropogon contortous*. In uncultivated areas *Andropogon* spp. and *Cymbopogon giganteus* are common. Opportunities exist in the tropical forest areas, primarily in the valley bottoms, to produce an additional short season crop in the 4-5 dry months, when food supplies diminish. These areas are already under cultivation in the wet months and would not involve the removal of trees. The proposed project does not involve any significant change in the natural vegetation of the area.