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ENVIRONMENTAL IMPACT OF IGNP ON THAR DESERT

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ABSTRACT

Indira Gandhi Nahar Pariyojana is the Indian arid zone is the largest irrigation project in the world, It promised to green the desert but has also waterlogged vast tracts of land and more stands in danger of being turned saline through this process. A number of factors viz, large percolation losses from the irrigation water applied to farmers fields, see page losses from channels, overuse of escape channels from the canal system, relatively low levels of groundwater development, restriction to regional groundwater flow due to subsurface barriess and absence of natural drainage are responsible for water logging, salinization and disturbance of natural groundwater balance in the region. The oversupply of irrigation of natural groundwater balance in the region.

KEYWORDS: *IGNP, Groundwater, Desertification, Flora and Fauna, Sustainability, Hazard.*

Introduction

The IGNP irrigation developments are taking. place in an area that was previously desert. The climate is characterized by low and unreliable rainfall, high summer temperatures and wind velocities and low humidities. There is a widespread cover of sand dunes and wind-blown deposits and active sand movement, with varying degrees of sand stabilisation, overlying sedimentary rocks laid down in marine, fluvial and Aeolian environment in the quaternary and tertiary epochs. The sediments are mostly sands, gravels and silts when of the Quaternary, and sandstones and lime stones, interspersed with shaley lignite, fullers earth, gypsiferous bentonitic clays, china clay and gypsum in the rocks of Tertiary age.

The natural vegetation is correspondingly sparse, consisting of hardy xerophytic species, many of which are becoming over-exploited as fodder or fuel. The natural groundwater normally lies at considerable depth and is generally highly saline. The origins of the salinity in the native groundwater presumably lie in the environment in which the sediments were deposited. There are pockets of fresh or brackish water within the generally saline natural groundwater system, created where recharge from rainfall is concentrated, and sometimes where the tertiary formations have particularly low permeability, allowing creation of perched water tables. The occurrence of such fresh water pockets has been exploited in the past as suitable sites for settlement in the harsh desert environment.

The fauna is typical desert species, and-like the flora- contains several rare or endangered species that depend on the desert habitat for their existence. In the past nomadic tribes moved between natural pasturelands with their flocks and herds, but these activities are now much reduced. In the areas on the desert fringe well away from the IGNP project, there are considerable pressures on the environment created by increased populations in these areas, developing problems of over-exploitation of groundwater, rangeland degradation and increasing desertification (see, for example, the discussion of the problems in the Luni River Basin by Sharma, 1998).

The coming of the IGNP scheme has opened up large areas of the desert to settlement and agriculture and something like 126000 allottees have been given land entitlements, resulting in a large in-migration in to the irrigated areas. Traditional rain fed crops in these areas have uncertain yields, and there have been considerable problems of catastrophic crop failure and famine in the past in the region. The advent of IGNP has given way to reliable, two-season cultivation of irrigated crops, with considerable emphasis on the cash-producing cultivation of cotton, mustard and groundnut. Not surprisingly, there has

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been an upsurge of economic activity as a result of the Scheme, and extensive infrastructural development within the area. Land prices are high, which is a very good indicator of the success of the project to date. Although, the development is not without some social tensions and significant technical problems, it detracts from this success.

Principal Environmental Impacts

The main environmental impacts of IGNP development can be summarized as follows:

Principal Beneficial Impacts

- Greatly increased agricultural activity, to the extent that improved food production has not only greatly reduced the likelihood of famine, but also has produced a food surplus.
- Greatly increased scope for settlement and land ownership, with associated employment opportunities and income generation, allowing large numbers of formerly landless people to become landowners.
- Significant poverty alleviation, with income-generating opportunities associated with on-farm activities and many supporting services, supply industries and marketing enterprises being created.
- Reduction in desertification influences, notably by stabilization of large tracts of sandy soils and sand dunes, both by irrigation development and by a forestation measures, and considerable increases in overall vegetation cover. Increases in biodiversity, notably of birds and mesophytic flora. Over 170 bird species have been observed in what was previously a desert area, and at least 10 new species have become resident.
- Establishment of agricultural and general social support services, and improved means of access, with further improvements in general quality of life.
- Establishment of suitable conditions for improving human and animal nutrition and drinking water quality and, therefore, for improving general health: some approximate 780 diggis (water storage tanks for rural drinking water provision) have been constructed and 1500 dispensaries opened since 1975. The development of a rising regional groundwater table, resulting in surface waterlogging and soil salinity, to the extent that at a few locations agricultural activities have ceased and settlements have had to be abandoned.
- Major changes to the sensitive desert eco-system, involving irreversible loss of desert flora and fauna as a direct result of the development of irrigated agriculture of particular concern are some rare and endangered species, including the very rare Great Indian Bustard, for which the Indian Thar desert is the last refuge. The influx of settlers and livestock put further pressure on the natural habitat, with further reductions in the flora and fauna. In particular, overgrazing (also at least a partial consequence of the reduction in rainfed rangeland areas) and collection of fuel wood contribute to land degradation and increased risks of wind-blown sand movement; at least until the Forestry Department sand stabilisation plantings become well established. In this context, the preservation of the Desert National Park (DNP) is particularly important. Canal construction and irrigation activities are at present planned on about 20% of the area of the DNP precluding wild life conservation in the affected areas and in a zone around the edges.
- Increased potential for the spread of water-related disease vectors and the diseases themselves, with falciparum malaria being a particular concern. Possibilities of the development of resistance to biocides and, additionally, environmental damage caused by the use of DDT as a mosquito control measure.
- Destruction of traditional rangelands and livestock passageways and consequent destruction of the associated nomadic ways of life. Although overall numbers are small compared with those benefiting from the project, the effects have been major for those affected. However, for those taking up irrigated agriculture, the economic returns are potentially much greater than traditional lifestyles, and those resident within the areas developed through the project are accorded highest priority in the process of allotting land in the scheme.
- Damage to archaeological sites in the Ghaggar river basin (notably the Harappan civilisation sites such as Kalibanga) due to waterlogging and high groundwater levels.
- Increased potential for the influx and development of agricultural pests diseases, notably new aquatic and terrestrial weeds and the accelerated spread of these and indigenous species.

Environment risks affecting project sustainability are largely the problems of waterlogging and secondary salinisation. Project risks include the movement of sand onto and across the development

areas, which continues despite the a forestation efforts, as a result of natural wind blowing from the Rann of Kutch. These imply substantial maintenance inputs for both the water supply and agricultural developments. The hazard is considerably reduced with project maturity, but can be a severe problem in the early stages of development. the overall environmental assessment is summarised in Table the positive and negative impacts are discussed in more detail in Annex H

Matrix Summary of Main Environmental Impacts

Environment Aspect	Environmental Impact by project Component							
	Canal and infrastructure construction	Water distribution network	Field-level Water Applications	Forestry Plantations		Settlement	Agricultural and livestock production	Rural Infrastructure
				Shelter belts	Other Plantings			
Positive Impacts								
Vegetation cover/sand stabilisation				*MT/LT+*	*MT/LT+*			
Food security/famine relief							*MT/LT+*	
Food surplus production							*MT/LT+*	
General health							*MT/LT+*	MT/LT+
Settlement of landless people						*MT/LT+*		
Employment and income generation	ST+						*MT/LT+*	
Human and animal nutrition							*MT/LT*	
Erosion/desertification reduction			*LT+*	*LT+*	LT+			
Biodiversity				LT+	LT+			
Communications and access to services	ST-					MT/LT+		
Negative Impacts								
Drainage, waterlogging, salinity		*MT/LT*	*MT/LT*					
Water-related disease		MT/LT						
Wildlife biodiversity				LT+	LT+	LT-	LT-	
Rainfed habitat and associated fauna						ST/MT/LT	*ST/MT/LT-*	
Indigenous lifestyle		ST/MT/LT					*ST/MT/LT-*	
Agricultural residues							MT/LT-	
Growth of aquatic weed		MT/LT						
Community cohesion						MT/LT		
Key to impact Assessment	Beneficial Impact		+	Adverse Impact		-		
	…….	…….	…….		LT	MT	ST	
	Major	Moderate	Minor		Long-term	Medium-term	Short-term	

It is believed that are sufficient resources available to tackle these problems in an appropriate manner, and so the project can be basically environmentally sustainable.

Sustainability

The long-term environmental sustainability of the project depends on the following key factors:

- Development of appropriate measures to prevent or mitigate groundwater rise to shallow depths, and consequent soil Stalinization. The problems will be more acute in the Stage II and Lift canal areas, where the presence of low permeability layers at comparatively shallow depths below the surface will affect the sub-surface movement of water.
- Establishment of environmentally sound measures for ultimate disposal of salt in the drainage water.
- Continuing efforts in a forestation and O & M activities to combat the effects of wind-blown sand deposition and growth of aquatic weed.

- Continuing public health measures, especially the anti-malaria campaign, to keep water-related health impacts at manageable levels.
- The development of an appropriate environmental monitoring programme, and review mechanism, to ensure that appropriate actions are taken further adverse environmental impacts develop.

Suggestions

- There is a need to determine the potential for bio-drainage to make areal contribution to reducing the need for artificial drainage, as well as making a positive contribution to the removal of salt from the system extensive trial area with detailed monitoring and analysis are need to determine how effective these measures can be. pilot projects take a long time to mature and hence they must be planned and implemented quickly to derive benefits in the future.
- Increased use of trees to transpire groundwater,
- Selective use of artificial drainage in areas of particular need.
- More carefully water management, lower water allowance for the farmers, and encouragement to move towards low volume, high efficiency irrigation methods and increased use of groundwater wherever the quality of water is adequate.

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