Environmental flow requirements *vis-à-vis* habitat use pattern of freshwater dolphins *Platanista gangetica*

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CONTEXT

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INTRODUCTION

- The development and management of water resources by human has altered the natural flow of Rivers.
- The impacts of flow change are obvious in the aquatic biodiversity.
- Environmental flows are critical for determinant of physical habitat in river and stream, which in turn is a major determinant of biotic composition in that particular ecosystem.
- Despite growing recognition of these relationships, ecologists still struggle to predict and quantify biotic responses to altered flow regimes.

Basin Blue Print (without Intervention)

River origin

Hydro Power Stn. (194)

I am a cumulative threat

Biodiversity

Industry

Barrage

Run of River

Tehri Dam

I disturb Natural-Flow

I am not Green

I need a clean river

Canal

Communities/
Agriculture

I add to river pollution
(Pesticides)

City/Urban

I am not Efficient

Ganga River

Communities/
Agriculture

I add to river pollution
(Pesticides)

Ganga River

Basin Blue Print (with WWF Intervention)

River origin

Hydro Power Stn. (194)

Biodiversity

Industry

Barrage

I turned green

Run of River

I am sustainable

Tehri Dam

I consider Natural Flows

I am a Living River

Communities/ Agriculture

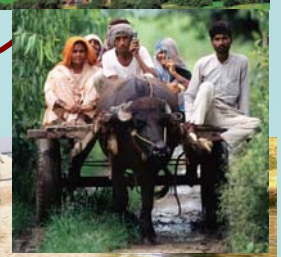
I am a better farmer

City/Urban

I am Efficient

Ganga River

Communities/ Agriculture



Ganga River

I am a better farmer

Ganges River Dolphin Conservation Project

BACKGROUND

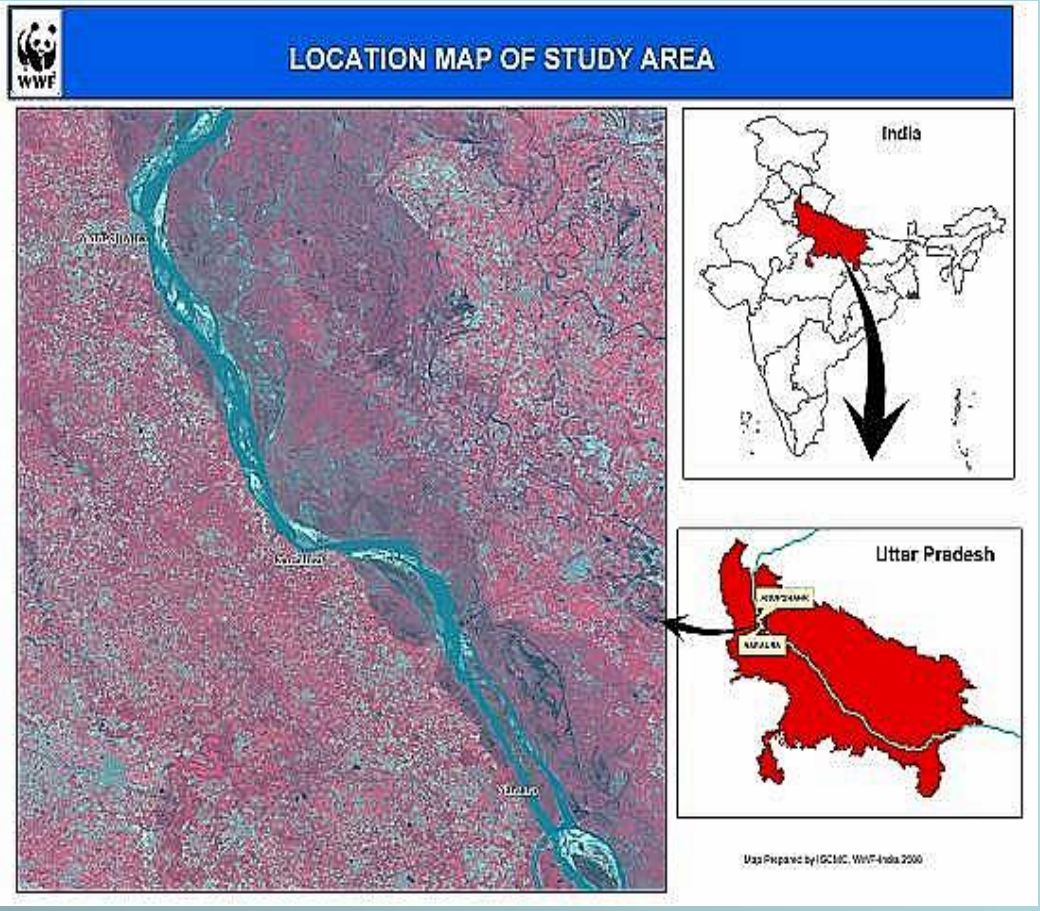
- The freshwater Ganges river dolphin *Platanista gangetica* is an endangered species. In India, the species is endemic to the Ganges and the Brahmaputra river systems

- The population of these dolphins have significantly declined in all its distribution range due to infrastructural activities causing habitat loss in our river system. In the Upper reaches of the Ganga presence of several dams and barrages have changed the natural characteristic of the River system.

- As the dolphins are in the top of the food chain in the riverine system, the impacts are drastic. Until 1991 these were considered extinct from the upper reaches of the Ganga (Ref; Bilgrami, K.S. 1991).

- WWF-India has initiated a study on Environmental Flows under the River dolphin conservation programme in UGR which is in progress.

STUDY AREA



River stretch : Anoopsaher to Narora
(30 Km)

Habitat Characteristics:

1) Shallow with only intermittent small stretches of deep water pools.
2) Banks: sandy and muddy.
   characterized by forest shrub and grasses.
3) Soil: Coarse textured alluvial adjacent to the river bank.
4) Fauna : Presence of aquatic mammals like dolphins and otters; aquatic reptiles like crocodiles and turtles; fishes; migratory birds and other bank-side wildlife.

METHODOLOGY

Data collection

Survey were conducted in first week of every month (February-07 to January 2008)

The boat transect method (Smith and Reeves 2000b) was adopted for dolphin estimates.

A 12 hrs schedule was followed from 0600 hrs to 1800 hrs with break of 3 hrs (1200 to 1500).

Survey were conducted in an inflatable boat with 30 hp engine at constant speed of 6 km/h.

Depth

A Garmin depth finder was used to measure the depth.

River flow

A flow probe FP 101 and 201 was used to measure the water velocity at 5 km regular intervals and also where dolphins were sighted.

Physical parameters

A multi line F/set 3 was used to measure DO, pH, temp. and conductivity of water during the field survey at 5 km regular interval and also where dolphins were sighted.

. Chemical parameters

14 parameters were analysed for determining the pollution level of the study stretch by the help of MERK Spectro photometer NOVA-60.

Data analysis

Observations of dolphin sightings were mapped on the GIS domain.

Relative abundance of dolphins was expressed in terms of encounter rates.

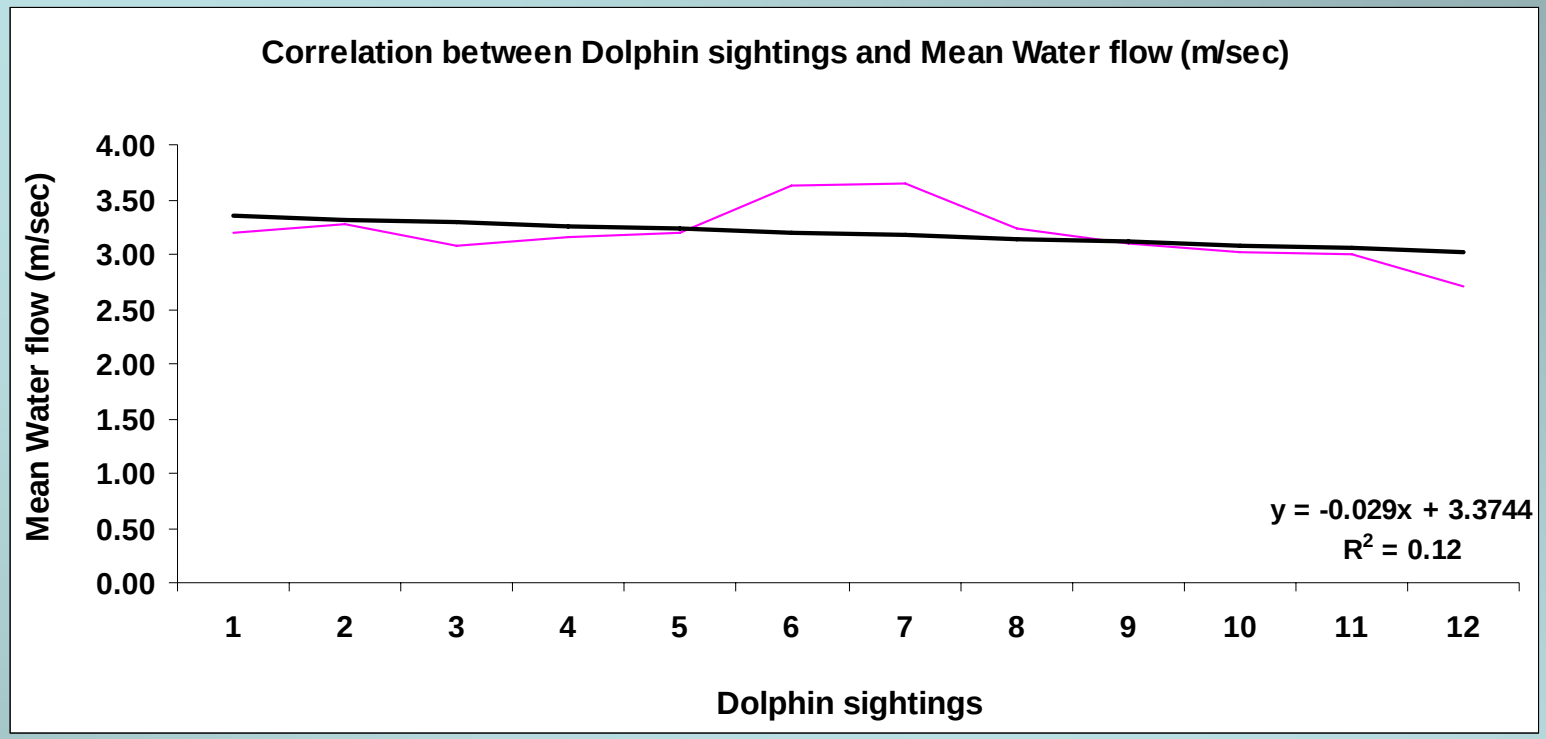
Linear relationships were drawn between dolphin sightings and habitat variables such as Water depth, Water flow, River width and Water temperature.

RESULT

Current status and distribution

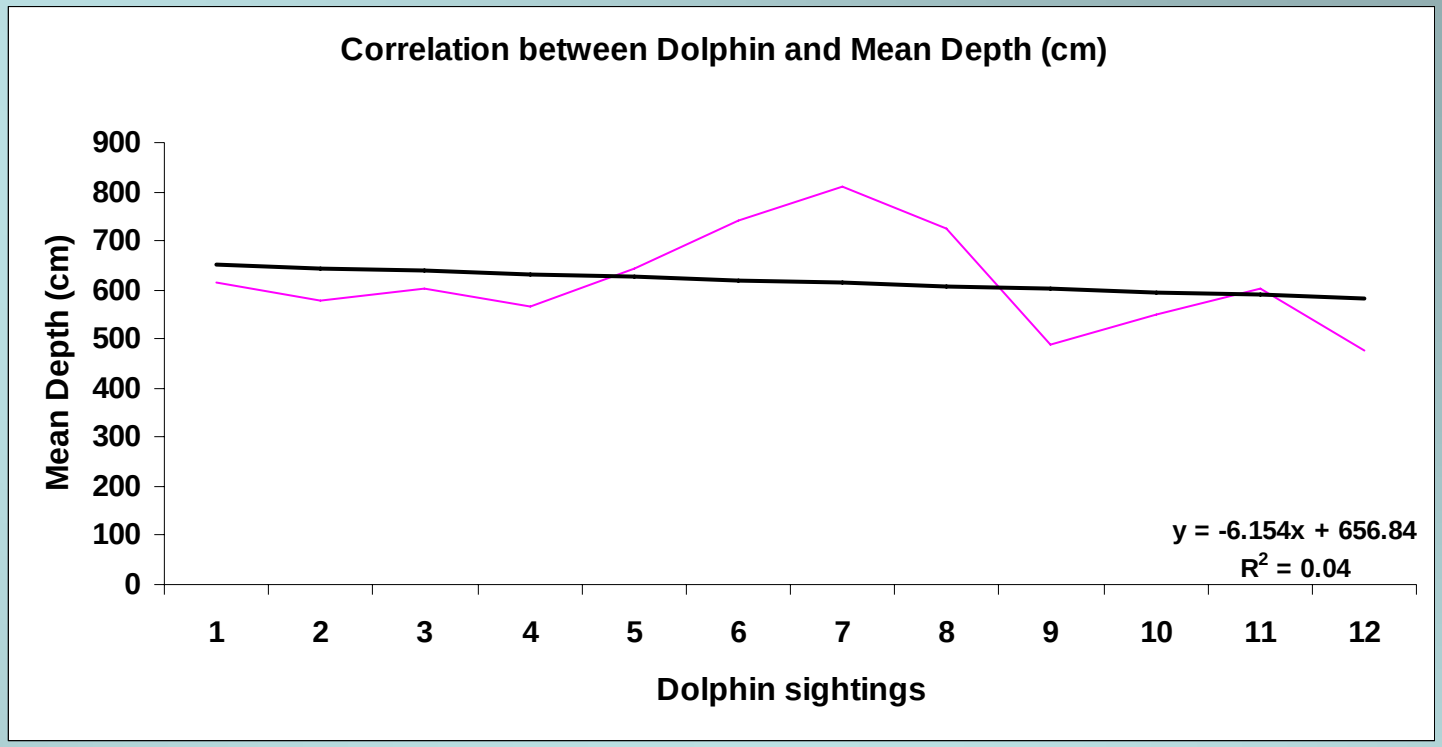
Relative abundance of dolphins was expressed as encounter rates (animal sighted /Km = 0.4 dolphins/Km)

Variables influencing habitat use pattern



The average water flow of the river stretch under the study area ranges from 1.2 m/sec to 4.9 m/sec and the dolphin occurrence was common at 3.19m/sec ± 0.07 m/sec.

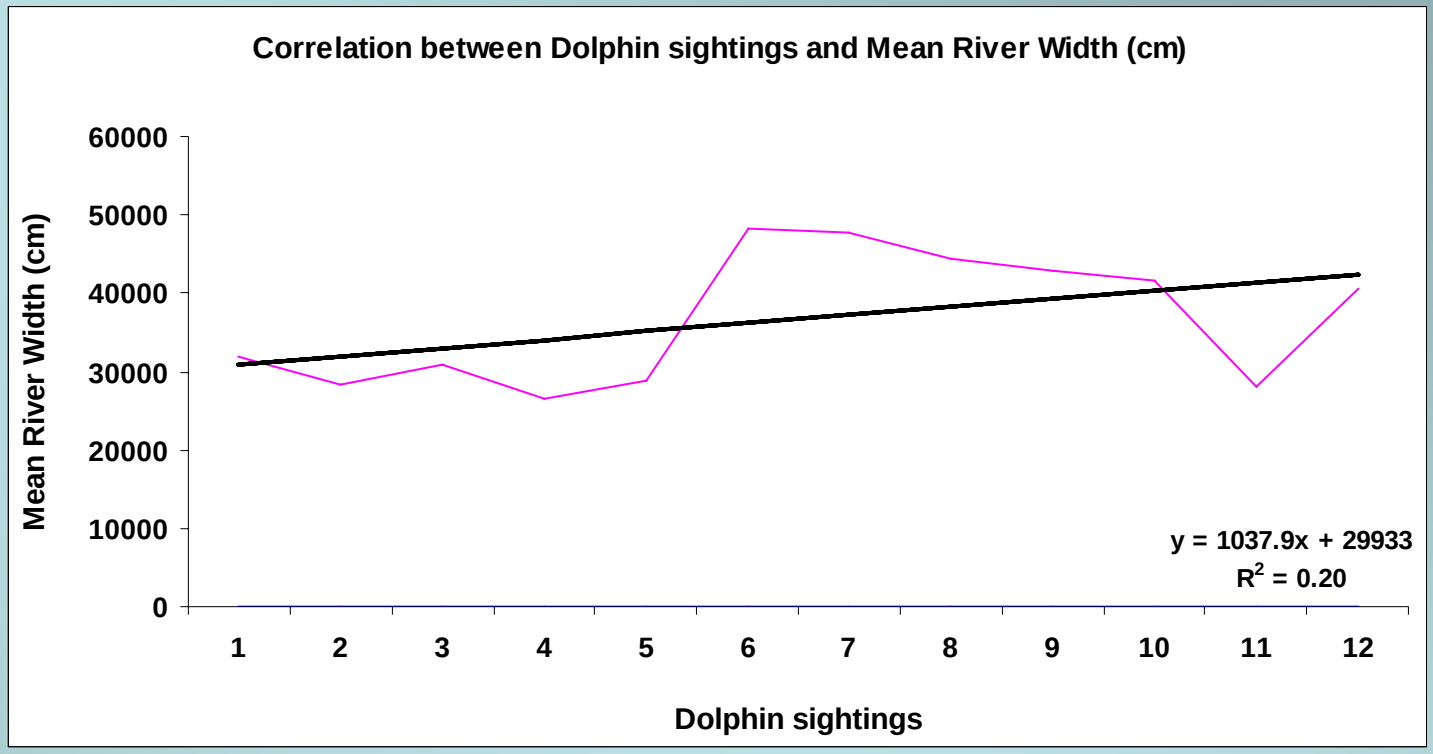
The occurrence of dolphins is moderately related to width (i.e R^2 =0.12) , in the study stretch of 30 km from Narora to Anoopsaher in the Upper Ganga River.



The average depth of the river stretch under the study area ranges from 2.1 m to 12.9 m and the dolphin occurrence was common at 6.1 m ± 0.3 m.

The occurrence of dolphins is moderately related to depth (i.e R^2 =0.04) , in the study stretch of 30 km from Narora to Anoopsaher in the Upper Ganga River.

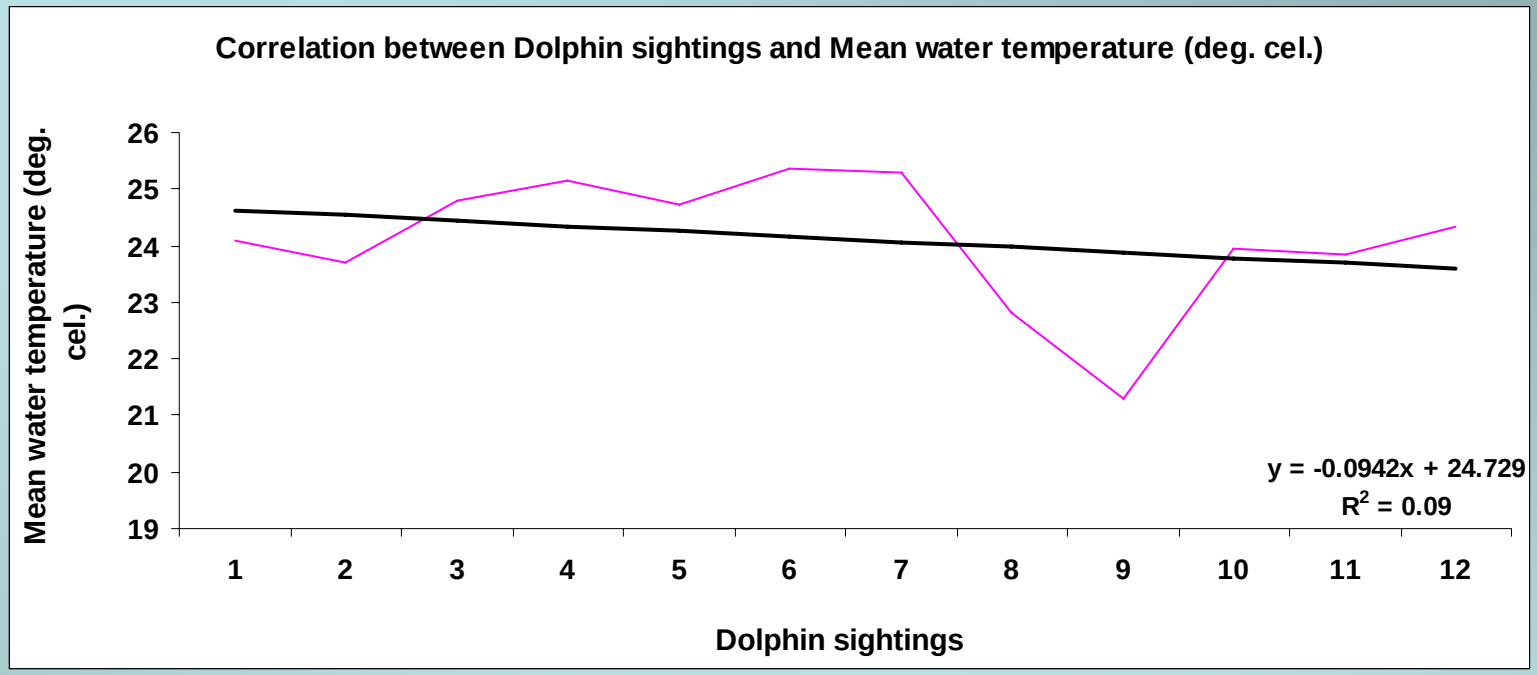
Deep water is usually preferred by the dolphins due to availability of temperature gradient, food present in different trophic levels and for breeding as well. However for feeding they move to shallow waters.



The average width of the river stretch under the study area ranges from 20 m to 1910 m and the dolphin occurrence was common at 366 m ± 24 m.

The occurrence of dolphins is moderately related to width (i.e R^2 =0.2) , in the study stretch of 30 km from Narora to Anoopsaher in the Upper Ganga River.

Dolphins move to much wider area during monsoon season and retreat to some sections of the river during other time to avoid habitat shrinkage and to avail good habitat conditions.



The average temperature of the river stretch under the study area ranges from 19.5^0 C. to 26.5^0C. and the dolphin occurrence was common at 24.12 ± 0.33^0 C.

The occurrence of dolphins is strongly related to temperature (i.e R^2 =0.09) , in the study stretch of 30 km from Narora to Anoopsaher in the Upper Ganga River.

Water quality parameters recorded in the dolphin habitat

(February 2007 – January 2008)

Parameters	Min.	Max.	Mean±S.E
pH	7	8.01	7.69±0.01
Temperature (^{0}C)	19.5	26.5	24.12±0.33
Dissolved Oxygen (mg/l)	6.5	8.4	7.57±0.02
Conductivity (µS/cm)	154	235	202.6±1.24
Calcium (mg/l)	36	134	95.09±2.4
Phosphate (mg/l)	17.1	29.6	24.7±0.27
Chloride (mg/l)	1.5	3.7	2.6±0.03
Sulphate (mg/l)	29	52	32.6±0.23
Nitrate (mg/l)	0.5	1.3	0.70±0.01
Magnesium (mg/l)	22.5	35.2	28.5±0.28
Ammonium (mg/l)	0.3	1.8	1.11±0.02
Lead (mg/l)	0.19	0.41	0.29±0.003
Floride(mg/l)	0.12	0.42	0.23±0.003

Note: Results of the above parameters fall under the permissible limits

•Movement of dolphins in search of food, breeding areas and for good cover is observed. The study revealed that dolphins move to much wider area during monsoon season and retreat to some sections of the river during other time to avoid habitat shrinkage and to avail good habitat conditions.

•Temperature is an important factor basically for its effect on most of the biochemical and physiological reactions taking place in aquatic organism inhabiting the river system. The study also shows a strong correlation between dolphins and temperature.

•The analysis of pH is essential in the dolphin habitat because it determines the intensity of acidity or alkalinity and concentration of hydrogen ion in the habitat.

•Dissolved oxygen is a very important parameter in the assessment of water quality. Its presence is essential to maintain various forms of aquatic life. In the present study it varies from 6.5 to 8.4 mg/l.

Conservation implications

- The results of this preliminary study will serve as baseline for a detailed study on the habitat requirement of the River dolphin.
- On the basis of the results of the detailed study, the environmental flows (e-flows) requirement for River dolphins can be arrived at.
- According to the e-flows requirement, River dolphin habitat conservation measures can be proposed and discussed with Government departments such as the Irrigation dept., State Pollution Control Board, etc. The departments will then be in a position to propose measures in their plans that will help in fulfilling the objective of this project.
- The water quality requirement (according to e-flows determined) will also help in assessing the impact of the sewage disposal system and the use of bio-fertilizers by the farmers in the project villages.


THANKS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