



Environmental Monitoring Report

Project Number: 30303
July 2009

IND: Karnataka Urban Development and Coastal Environmental Management Project

Prepared by Karnataka Urban Infrastructure Development and Finance Corporation Limited
(KUIDFC)

Executing Agency

Bangalore, Karnataka, India

For Karnataka Urban Infrastructure Development and Finance Corporation Limited

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Asian Development Bank

KUDCEMP/1704IND/August 2008 to July 2009

Environmental Monitoring Report

Loan Number: 1704 IND

Reporting year: August 2008 to July 2009

Karnataka Urban Development and Coastal Environmental Management Project (KUDCEMP)

Prepared by : KUIDFC

Implementing Agency : KUIDFC

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1. Introduction:

- **Overall project description**

Karnataka Urban Development and Coastal Environmental Management Project (KUDCEMP) has been conceived with the purpose of optimizing social and economic development in the urban areas of coastal Karnataka by supporting investment in urban infrastructure and services required to meet basic human needs. It also proposes to establish an appropriate environmental planning, management and monitoring mechanism to address the potential environmental impacts associated with urbanization and industrial growth in the region.

The sub-projects under KUDCEMP comprises of water supply, under ground drainage along with treatment of sewage, solid waste management, storm water drains, improvements to urban transport, municipal building, public toilets, low cost sanitation etc., The overall physical progress of the project is about 90%. The ADB loan portion of US \$ 145 million is scheduled to be spent within 30th September 2009 which is the revised loan completion date. Barring 16 UGD contracts of Mangalore & Udupi towns, all other contracts will be completed within 30th September 2009. The spill over works will be taken up by state funds and are scheduled to be completed within 31st March 2010.

KSPCB has been entrusted with the work of Monitoring of the environmental receptors/ attributes for the 10 project towns. Under KUDCEMP, necessary infrastructure is provided to KSPCB for carrying out the environmental monitoring efficiently, three buildings viz at Mangalore, Udupi & Karwar have been constructed and handed over to KSPCB. Thus an institutional arrangement is in place for environmental monitoring.

- **Environmental category:** The project is classified to be of Environment Category B.

2. Compliance status with National/ State/ Local Statutory environmental requirements

Tabular presentation of statutory environmental requirements for the sub projects at national, state and local levels and their status.

Sl. No.	Statutory environmental requirements	National level	State level	Local level	Compliance Status	Actions proposed for achieving compliance	Remarks
I	Sewage Treatment Plants¹						
1	Consent to Establish (CFE)						
i)	Mangalore	NA		NA			Consent for Establishment has been obtained for all the STPs from KSPCB. The conditions pertaining to design and construction of STPs are complied.
a)	Mudushedde		*				
b)	Surathkal		*				
c)	Kavoor		*				
d)	Jeppinamogaru		*				
ii	Udupi		*				
iii	Karwar		*				
iv	Bhatkal		*				
2	Consent to Operate (CFO)						
i)	Mangalore	NA		NA			STPs are being constructed. Application for Consent for Operation will be made with KSPCB by the ULBs to obtain CFO prior to commissioning
a)	Mudushedde		**				
b)	Surathkal		**				
c)	Kavoor		**				
d)	Jeppinamogaru		**				
ii)	Udupi		**				
iii)	Karwar		**				
iv)	Bhatkal		**				
II	Solid Waste Management						
1	Authorization for setting up and operate waste processing/ disposal facility.						
i	Mangalore [^]	NA	***	NA			^ - Mangalore & Ullal have common Landfill site. All landfill sites have valid authorizations from KSPCB. The conditions pertaining to design & construction of landfill site facilities are complied.
ii	Puttur		***				
iii	Udupi		***				
iv	Kundapur @		***				
v	Karwar		***				
vi	Sirsi @		***				
vii	Dandeli @		***				
viii	Bhatkal @		***				
ix	Ankola		***				
2	Forest clearance						
i	Karwar	♣			Complied		Karwar - Both 1 st and 2 nd stage clearance obtained.
ii	Sirsi @	♣					
iii	Bhatkal @	♣					

¹ STPs at Karwar, Bhatkal, Udupi and Kavoor in Mangalore are almost complete and the remaining STPs are under construction (70% complete).

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iv	Dandeli @	♣	NA	NA		
v	Ankola	♣			Complied	Obtained
3	NOC from AAI					
i	Mangalore	✓	NA	NA	Regional Office has recommended for final approval	N A NOC from AAI awaited.
III	Water Treatment Plants (WTPs)					
i	Mangalore	NA	NA	NA		CFE & CFO for WTPs are not mandated by KSPCB. In Sirsi approval obtained from Ministry of Environment and Forest for laying pipelines and for construction of jack well.
a	Ramalkatte					
b	Panambur					
ii	Kundapura					
iii	Puttur					
iv	Udupi					
v	Bhatkal					
vi	Sirsi					
vii	Karwar					
viii	Dandeli					
IV	Barrage Construction					
i	Puttur	NA	NA	NA		No environmental clearances required.
ii	Udupi					
iii	Bhatkal					
V	Clear water transmission mains					
i	Ullal - Clear water transmission mains – Part I and II	NHAI Clearance	NA	NA		No environmental clearances required. NHAI clearance obtained.
VI	Coastal Environmental Management, Roads & Eco Tourism					
i	Mangrove rehabilitation and coastal plantation by Department of Forests	NA	NA	NA		No environmental clearances, including those under CRZ required.
ii	Improvement to National Park and Wild life Sanctuary by Department of Forests	NA	NA	NA		Clearance from Forest department not required, No environmental clearances, including those under CRZ required.
iii	Malpe beach – road from beach to harbor	NA	NA	NA		No environmental clearances, including those under CRZ required.
iv	Approach road to Om beach	NA	NA	NA		No environmental clearances, including those

	from Gokarna						under CRZ required.
v	Improvement of road to Sahasralinga	NA	NA	NA			No environmental clearances, including those under CRZ required.
vi	Prevention of sea erosion works (toy train at Karwar)	NA	NA	NA			No environmental clearances, including those under CRZ required.
vii	New approach road to airport terminal building in Mangalore.	AAI Clearance	Forest dept	NA			Approval of the Airport authority of Mangalore obtained. Forest dept. permission obtained for cutting the trees No other clearances are required.
viii	Improvement of road to Yana from Sirsi.	NA	Forest dept	NA			Forest Dept. Permission obtained
ix	Improvement to roads in Pilikula nature park, environmental education centre and recreation facilities, Mangalore	NA	NA	NA			Executed with approval of Pilikula Nisargadhama society. No other permissions were required.

NA – Not Applicable.

- *-Consent for Establishment from Karnataka State Pollution Control Board.
- **-Consent for Operation from Karnataka State Pollution Control Board.
- @ - sub-projects dropped from ADB funding.
- ***-Authorization from Karnataka State Pollution Control Board.
- ♣ -Clearance from Forest Department, Govt of India
- √ -Clearance from Airport Authority of India

3. Compliance status with the environmental covenants as stipulated in the Loan Agreement

Sl. No.	Covenants	Status of Compliance
1	The borrower and the state shall incorporate environmental and social measures for each component	This has been taken care of at the design stage. Safeguards are ensured during Operation and maintenance which is a

<p>in each component in each project town. [LA, Schedule 6, Paras. 10 (a) to (f)]</p> <p>The Borrower and the State shall carry out the following in each Project Town:</p> <p>10 (a) Water supply work including selection of efficient filter plants and chlorinators, regular monitoring of water quality, functioning of pumps/meters;</p> <p>10 (b) Sewerage and sanitation facilities including reduction of risk of communicable diseases, regular monitoring of water quality parameters;</p> <p>10 (c) Solid waste management including identification of disposal & treatment sites, O&M activities;</p> <p>10 (d) Drainage work reducing flooding and mosquito breeding, desilting, regular cleaning of drains;</p> <p>10 (e) Road work including planning and engineering to mitigate traffic congestion, erosion, noise and vibration; and</p> <p>10 (f) Management of environmental resources in the coastal areas by preparation of CRMCP, establishment of pollution control and environmental monitoring program.</p>	<p>continuous process.</p> <p>All the design and construction stage safeguards of the covenants under paras. 10 (a) to (f) have been complied.</p> <p>Compliance with safeguards related requirements will also be ensured during operation and maintenance stage.</p>
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4. Compliance status with environmental management and monitoring plans

- Tabular presentation of environmental management and monitoring plans and environmental assessment

Sl. No.	Environmental management and monitoring plans	Agency Responsible	Remarks
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Sewage Treatment Plants			
1	Provision of Buffer zone	Urban Local Body	Sufficient Buffer zone is provided.
2	Provision of Chimney and acoustic enclosure to D.G. Sets	Urban Local Body	Express feeder lines, for continuous power supply, provided to all the STP sites, hence no D.G. Sets are installed.
3	Operation & Maintenance	Urban local Body	On commissioning of the plants regular Operation & Maintenance to be carried out. This is a continuous process.
4	Discharge of treated effluent	Urban Local Body	Treated effluent will be discharged either to inland surface water/ public sewers/ irrigation land/ marine coastal areas as approved by KSPCB. Samples collected & tested for the parameters stipulated by the Pollution control Board.
5	Disposal of sludge	Urban Local Body	Sludge digestion and disposal has been a part of design. The sludge generated during O & M will be disposed off in a scientific manner without causing under ground and surface water pollution at Landfill sites approved by KSPCB. The solid waste will be disposed off without causing eyesores to the public at Landfill sites. The digested sludge shall be composted and utilized as manure based on field conditions.
6	Ambient air quality monitoring	Urban Local Body	As the STPs are yet to be commissioned the ambient air quality monitoring of these sites for stipulated parameters to comply with KSPCB norms/ standards will be done after the STPs are operationalized.
Solid Waste Management			
1	Landfill site selection	Urban Local Body	Landfill sites have been identified for all 5 project towns as per MSW Rules 2000. (Mangalore and Ullal have a common site) The necessary approvals and clearances have been obtained.
2	Provision of Buffer zone	Urban Local Body	Sufficient Buffer zone is provided with 3 to 5 rows of tree plantation.
3	Construction of landfills	They are constructed by KUIDFC for ULBs	After the construction, the landfills are handed over to ULBs for its regular operation as per the mandate ULB officials are provided with

			proper training along with O&M Manuals
4	Water quality monitoring wells	Urban local body	Based on the test reports of the monitoring conducted, it is observed that the under ground water quality in near by wells is within the prescribed standards.
5	Ambient air quality monitoring Transportation of waste missed out. Please add.	Urban Local Body	Based on the test reports of the monitoring conducted, it is observed that the Ambient air quality at near by locations across the site is within the prescribed standards.
Water Treatment Plants			
1	Provision of Buffer zone	Urban Local Body	Sufficient Buffer zone is provided.
2	Operation & Maintenance	Urban local Body	On commissioning of the plants regular Operation & Maintenance to be carried out by the ULBs. This is a continuous process.
3	Disposal of Alum sludge	Urban Local Body	Alum Sludge will be disposed off in a scientific manner at the Landfill site approved by KSPCB, without causing under ground and surface water pollution.

5. Approach and methodology engaged for environmental monitoring of the project.

Monitoring of the environmental receptors/ attributes is being done by the State Pollution Control Board (PCB) for various parameters of environment to assess major changes, if any, in the environment to take necessary measures to protect the environment. Monitoring is done as per the procedures of KSPCB on a periodic basis. The samples for monitoring the same are being collected from in and around the sites. To ensure continuity and sustainability of monitoring, KUIDFC has extended funding support to KSPCB by constructing buildings for establishing full fledged laboratories in 3 District headquarters namely Mangalore, Udupi & Karwar. Thus an institutional arrangement is in place for environmental monitoring.

In order to have an integrated management and sustainable development of coastal areas, KSPCB is also establishing a Coastal Environmental Management and Policy Research Cell at Mangalore as a sub-centre of Bangalore office. Two coastal regional labs are also established at Udupi and Karwar to effectively cover the environmental monitoring of entire Coastal Karnataka region which also covers the 10 project towns under KUDCEMP. These three buildings have been constructed under KUDCEMP.

- Standards /monitoring methods to be employed for assessment
The standards employed for assessment are as prescribed by the Pollution control Board (PCB)

6. Monitoring of environmental receptors/ attributes (e.g. ambient air, surface water, ground water, land, ecological aspects, noise, hazardous/toxic wastes, etc.)

- Type of environmental receptor/attribute to be monitored (for each type)

For Landfill sites the environmental receptors/ attributes monitored are:

- a) Ground water quality
- b) Ambient air

For STP sites: the ambient air quality.

Regular monitoring of these sites for stipulated parameters will be done after the STPs are operationalised.

Compliance to Environmental Management and monitoring plans during construction phase as per the IEE report for Mangalore airport link road is provided as annexure 1.

- Method of monitoring:

For landfill sites by drawing and collecting ground water samples from the vicinity of these sites and were tested for the standard parameters by KSPCB at their laboratories.

For ambient air quality by setting up the mobile laboratory of KSPCB at these sites and monitoring of standard parameters was done continuously for 24 hours near the vicinity of landfill sites. The same would also be followed for STPs after they are operationalized.

- Duration and frequency of monitoring:

Monitoring was carried out by KSPCB periodically as per their requirement

Generally the frequency of sampling done by KSPCB is monthly for physical, chemical and biological parameters

- Equipment /instrumentation to be used for monitoring

Standard equipments / instruments like High Volume Air Sampler, pH meter etc, were used by KSPCB for ambient air and ground water quality monitoring. Most of the tests were done by analysis by titration.

- Sampling locations/ sites for monitoring

Ground water samples were drawn from in and around the landfill sites at varying distances. Ambient air quality was checked in and around the landfill sites.

Ambient air quality monitoring was done around STP sites the inlet (influent) and outlet (effluent) sewage quality will be monitored regularly to comply with the discharge standards by the ULB as per the KSPCB's guidelines under Consent for operation (CFO)

The Inlet and outlet Water Quality is regularly monitored by ULBs to conform with drinking water standards.

- Reporting monitoring results (provide tabular presentation)

One sample monitoring result for ground water and ambient air quality near three

landfill sites is provided below

a) Sample test results of Ground water samples collected near three landfill sites.

Sl. No.	PARAMETERS	Unit	KSPCB Std. Limits	Results		
				Karwar	Puttur	Mangalore
1	pH	--	5.5-9.0	8.4	7.5	7.2
2	BOD 27° 3 days	mg/l	30	11	ND	5.7
3	COD	mg/l	250	237	ND	8
4	Dissolved solids	mg/l	2100	740	216	427
5	Suspended solids	mg/l	100	20	ND	23
6	Chloride Cl	mg/l	250	140	14	10
7	Total Alkalinity as CaCO ₃	mg/l	300	84	46	80
8	Ammonical Nitrogen as N	mg/l	50	ND	ND	1.5
9	Nitrate, as NO ₃	mg/l	45	ND	ND	2.83
10	Fluoride F	mg/l	0.6 to 1.2	0.8	ND	ND
11	Phosphate, as P	mg/l	--	ND	ND	0.67
12	Sulphite, as S	mg/l	200	ND	4	Nil
13	Colour	Hazen	10	Colorless	Colorless	Colorless
14	Odour	Unobjectable		Odourless	Odourless	Odourless
15	Total Coliform	MPN	MPN/100ml	Nil	Nil	Nil
16	Fecal Coliform	MPN	MPN/100ml	Nil	Nil	Nil

Note: ND – Not Detected

b) Sample test results of ambient air samples collected near three landfill sites.

Time of sample collected	24 hours	24 hours	24 hours		
(Above datas are as per Field Data Sheet)					
Sl. No.	Parameter	Results			KSPCB Standards in $\mu\text{gm}/\text{m}^3$
		Karwar	Puttur	Mangalore	
1	RSPM, $\mu\text{gm}/\text{m}^3$	23	--	--	100
2	NON-RSPM, $\mu\text{gm}/\text{m}^3$	19	--	--	--
3	TSPM, $\mu\text{gm}/\text{m}^3$	42	73	97	500
4	Average SO ₂ , $\mu\text{gm}/\text{m}^3$	2	8	5	120
5	Average NO _x , $\mu\text{gm}/\text{m}^3$	10	13	12	120

- Correlate the monitoring results with statutory requirements at national/state/local levels

Based on the tests reports, the results were correlated with the prevailing National and State standards for the parameters tested/analyzed and it is viewed from the results that almost all the parameters tested are well within the permissible limits and conform with National and State Standards.

7. Any other environmental aspects, impacts observed during implementation which were not covered earlier

No major environmental aspects, impacts were observed during the implementation of the

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project. In order to train the ULB staff to manage environmental aspects and supervise the EMMPs during O&M phase, four training programmes on the O&M aspects were conducted at Udupi, Puttur, Mangalore & Belgaum for all 10 towns, covering the technical and environmental aspects.

8. Details of Grievance Redress Committee and complaints received from public and actions taken thereof to resolve

Public consultations were conducted during implementation of KUDCEMP project on environmental issues and a grievance redressal mechanism was put in place for the project. More than 350 consultation meetings have been conducted with all the concerned including ULBs, NGOs, and public of the ten project towns. The queries raised by the public/NGOs were duly addressed. For ex. A concern was received by Ms. Dinker regarding cutting of trees in Mangalore along a road widening sub-project under contract package number 1109. The query was addressed and Ms. Dinker was informed that tree cutting was required as part of junction improvement for which road widening was done, in order to make provision for free left turn for public vehicles to improve traffic safety, and avoid traffic congestions, and that the trees were cut only after obtaining statutory permissions from forest departments.

9. Follow-up actions and conclusions

Follow-up actions

When the STPs are operationalized after completing the house service connections the ambient air quality of these sites will be monitored on a periodic basis by the KSPCB and the respective Urban Local Body will be responsible for taking corrective measures if any.

AAI, New Delhi, NOC clearance for Mangalore landfill site

Conclusions

The Project has improved the overall environment and sanitation of the 10 towns of coastal Karnataka with proper management and disposal of solid waste and the waste water. It has also contributed in providing pure and safe drinking water to the citizens of the project towns. It will further contribute once the STPs are operationalized.

The implementation of overall project has result in reduced pollution levels and improved health and hygiene of the citizen. The environmental monitoring thus far has shown that the project intervention has not resulted in any adverse impact to the environment.

Signed by:

Monitoring agency:

(name, title, date)

Authorized signatory from Implementing Agency /Executing Agency:

(name, title, date)

Annexure - 1

Environmental Monitoring & Management Plan

No	Activity	Possible Environmental Impact	Suggested Mitigate Measure	Status of Compliance
Pre-Construction Phase				
1	Cutting of trees, clearing of shrubs	Loss of vegetation and trees	<ol style="list-style-type: none"> 1. Minimize tree cutting to the extent possible with design and engineering measures. 2. Under take afforestation measures to compensate the tree cutting, if any. Two trees shall be planted for every tree cut down. 	<p>Incorporated during designs.</p> <p>Airport Authority of India is taking action to plant saplings along the new road alignment</p>
Construction Phase				
1	Excavation, blasting, earth fill and transportation of materials	Dust contamination, Deterioration of air quality and increase noise levels	<ol style="list-style-type: none"> 1. Dust suppression measures shall be taken at the areas of excavation and embankment areas. Frequent watering shall be done to arrest the dust. 2. Any high noise generating activities such as blasting shall be done with permission of concerned authorities and the people living in the immediate surroundings shall be informed prior of the magnitude and location of the activity. 3. Dust generation from construction material transportation along the route and spilling shall be avoided with proper covering. 	<p>Complied.</p> <p>Blasting has been avoided.</p> <p>Complied.</p>
2	Operator of construction equipments and vehicles	Deterioration of air quality	1. The air emission from construction equipment/ machinery shall confirm to the standards.	Complied.
		Increase noise levels	2. The construction equipment shall confirm to	Complied.

			the standards; and noise level shall not exceed 75 dB(A) measured at a distance of 1 m from the equipment in free field.	
		Impact on water quality due to spillage construction material in the water bodies and blockage of cross drainage	3. The construction are shall be confined using proper engineering measures like fencing and no excavated earth/construction material/ fuel and other lubricants or any other hazardous material used for equipment shall not be allowed to mix with the water bodies.	Complied.
3	Water extraction and borrow areas	Impacts on water quality, changes in topography	<ol style="list-style-type: none"> 1. No new borrow areas are envisages for the project. 2. Water requirement for the construction should be from surface water sources like tanks and river with all statutory clearances. 3. No ground water source should be utilized for the water requirement of the project. 	<p>Complied.</p> <p>Complied.</p>
4	Traffic diversions and safety issues	Safety issues of workers and local population residing along the project road	<ol style="list-style-type: none"> 1. Safety measures such as display boards at necessary locations at the construction site shall be erected to avoid any accidents. 2. Adequate safety precautions like wearing of gloves, helmets, earplugs, safety shoes etc., should be provided and the same has to be ensured during the construction. Protective goggles shall be provided for welding workers. 3. The local people shall be informed about the new approach roads and vehicle movement and signboards shall be put up indicating directions 	<p>Complied.</p> <p>Complied.</p> <p>Complied.</p>
5	Disposal of construction debris	Dust and water contamination	1. Debris transportation along the route should be done with proper covering to avoid	Complied.

			2. Earth from excavated activities shall be disposed off immediately at the designated locations which should be located at least 1 km away from habitations, forest and water bodies. Daily inspection of site for construction debris, its collection and disposal to designated landfill sites.	Complied.
6	Temporary Labour camps	Creation of unhealthy conditions and pollution of surface water	1. Adequate water supply to be provided for the construction workers. 2. Adequate sanitation facilities should be provided to the workers. Regular cleaning shall be under taken to maintain the cleanliness to avoid any health hazards. 3. A work demobilization shall be planned and implemented to clear the construction site and surroundings. Site restoration shall be under taken and there shall not any material /waste left on the site.	Complied. Complied. Complied.
Operation and Maintenance				
1	Traffic Movement	Air pollution	1. Development of green belt all along the alignment within the ROW on either side of the project road.	Airport Authority of India is taking action to plant saplings along the new road alignment
		Noise pollution	1. Minimization of use of horns near settlements and during night time with the help of signboards in proper positions.	