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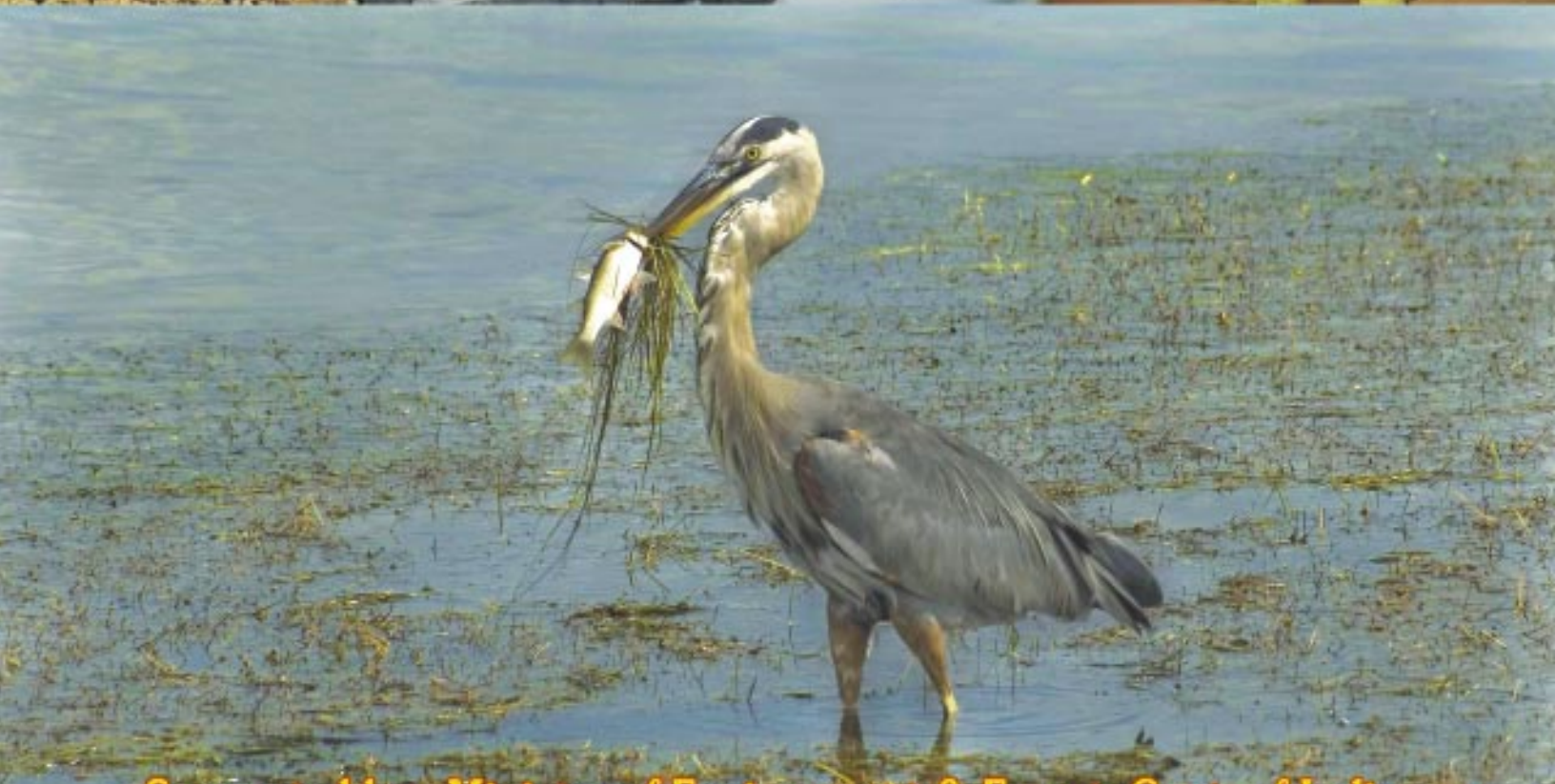

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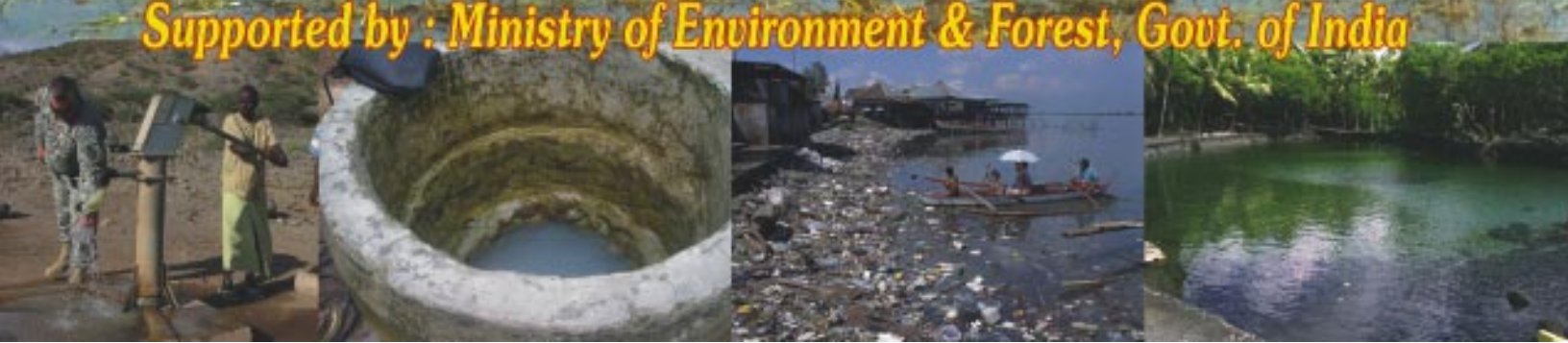


From the Director's Desk...

We are coming up with new issue of environment everytime. This issue depicts about 'A Life Force : Water'. I hope the information content in this issue will be useful.

I appreciate the efforts of ENVIS Team in collecting the datas and information for this issue.

Shri Bhagirathi Behera, IFS
Director, Centre for Environmental Studies

Water : A Life Force

INTRODUCTION:

To adopt a famous intellectual vocation, water takes the responsibility of both creating and destroying the living world. "Origin of life" dates back to thousands of years when water provides an instrumental platform to the possibility of life. It will not hyperbolic to say that the entire earth belongs to water which has been playing a constant key-role in the evolution process of human civilisation. Visualising the importance of water not as a mere common liquid supporting our survival but as a soul of life, it has been always been revered and respected. What regrettable about this majestic element of life formation is its unorganised management and the malignant cognitivity of the so called greatest creation called man.

(Returning with emty water pots)

Water possessing its multi faces

(No more water, please...)

An Over View :

Water has supported mankind since the first syllable of recorded time. With the advancement of science & technology which aided rapid utilization of natural resources water, which ironically gives foundation to origin of species, came to be treated with contempt.

Orissa can be rightly described as rich in water resources. Yet, water which symbolises life, has not reached every part of the state to quench thirsty months and lands, for domestic as well as irrigation purpose. The vast potential has not been exploited. Apart from non-exploitation, ill-traditionally sustainable and equitable methods of water use while aggravating the problems of domestic and agricultural water needs.

Water Resources of Orissa :

Orissa receives an average annual rain fall of 200c.m over a geographical area of 15.56M.Ha and total volume of 23.46m.ha.m water ever year. The estimate shows that about 10.55m.ha.m of rain water flows through the river systm of Orissa lying in the state. The amount of this runoff is further suplymented by the water received from out side the state resulting in to a total volume of 17.43m.ha.m. The whole surface

flow may not be fully useable as the coastal flow surface can't be retained for use. Inter state agreements have made some binding rules for utilisation of water flow of inter state rivers. The following (table-1) shows that Orissa has 7.84m.ha.m of surface water resource annualy utilisable as per the draft master plan.

Table-1: Water Resource of Orissa (in m.ha.m)

Water flow through the network of river system as surface run off and discharge through ground water, acquifers and springs	10.55
Annual river flow from out side states	6.88
Total river flow to sea or out side states	17.43
Total ground water restorable for utilisation annually	1.98
Total Annually utilisable water resources from surface flow as per draft master plan	7.84

The following (table-2) shows that the water resources parameters and temperature variation in different agro climatic zone of Orissa.

Table-2: Water Resource of Orissa (in m.ha.m)

Name of the agro climatic zone	Temperature	
	Summer	winter
North central plateau	36C	11.1C
North western plateau	38C	15C
Plains of Eastern Ghat	37.8C	11.9C
Western undulating plains	40C	12.4C
Eastern Ghat south uplands	34.1C	13.2C
South eastern region of Eastern Ghat	37C	10.4C
East and south eastern coastal plains	38.7C	14C
North eastern coastal plains	39C	11.5C
Mid Central ridge Region of the state	37C	10.4C

An Overview of Water Resources of Orissa

Orissa depends largely upon monsoon for its water resources. Southwest monsoon triggers rainfall in the state. About 78% of total annual rainfall occurs during the period from June to September and the balance 22% in the remaining period. In addition to seasonal availability, the rainfall in the state also shows spatial variation i.e. from about 1200 mm in southern coastal plain to about 1700 mm in northern plateau. This has resulted in causing droughts in some parts of the state and floods in some others. The long-term average annual rainfall in the state is of the order of 1482 mm. Under normal condition, the state receives annual precipitation of about 230.76 billion cubic metres (BCM) of water. Of the total precipitation, a part is lost by evaporation, transpiration and deep percolation and a part stored in the form of ground water reserve and the remaining appears as surface runoff. The groundwater reserve and surface runoff constitute the water resources of the state. The water resources scenario of Orissa and India are given in the table below.

Water Resources: India & Orissa (Unit in BCM)

Description	India	Orissa
Annual Precipitation	4000	230.76
Average Annual Water Resources	1869	141.408
Utilizable Water Resources (Surface & Ground)	1122	108.147
Utilizable Resources (% of precipitation)	28%	47%

Surface Water Resources:

The state is endowed with an extensive network of rivers and streams. As per an assessment made in 2001, the average annual availability of surface water is estimated as 120.397 BCM. Out of the above, the yield from its own drainage boundary is 82.841 BCM and inflow from neighbouring states through interstate rivers is 37.556 BCM. Considering the topography and geological limitations, 75% of the average annual flow can be utilized. Due to increasing demands for water for various uses, an attempt has been made to assess the availability of water by the year 2051. The

assessment reveals that the surface water availability from its own drainage boundary remains more or less fixed but the inflow of surface water from neighbouring states will be reduced from 37.556 BCM to 25.272 BCM. The following table shows the assessed inflow of surface water pertaining to the years 2001 and 2051.

Assessed Inflow of Surface Water Scenario: 2001

Basin Name	Average Annual flow (in BCM)			75% dependable flow (in BCM)		
	Own	Outside State	Total	Own	Outside State	Total
Mahanadi	29.90	29.255	59.155	25.508	23.225	48.732
Brahmani	11.391	7.186	18.577	8.849	5.521	14.011
Baitarani	7.568	-	7.568	5.434	-	5.434
Rushikulya	3.949	-	3.949	2.782	-	2.782
Vamsadhara	5.083	-	5.083	3.881	-	3.881
Budhabalanga	3.111	-	3.111	2.521	-	2.521
Kolab	11.089	-	11.089	8.885	-	8.885
Indravati	6.265	-	6.265	4.451	-	4.451
Bahuda	0.438	-	0.438	0.213	-	0.213
Nagavali	2.853	-	2.853	2.322	-	2.322
Subernarekha	1.193	1.115	2.308	1.193	1.115	2.308
Total	82.841	37.556	120.397	65.679	29.861	95.540

Assessed Inflow of Surface Water (Future Scenario: 2051)

Basin Name	Average Annual flow (in BCM)			75% dependable flow (in BCM)		
	Own	Outside State	Total	Own	Outside State	Total
Mahanadi	29.90	21.039	50.939	25.508	16.702	42.210
Brahmani	11.391	3.118	14.509	8.849	2.395	10.884
Baitarani	7.568	-	7.568	5.434	-	5.434
Rushikulya	3.949	-	3.949	2.782	-	2.782
Vamsadhara	5.083	-	5.083	3.881	-	3.881
Budhabalanga	3.111	-	3.111	2.521	-	2.521
Kolab	11.089	-	11.089	8.885	-	8.885
Indravati	6.265	-	6.265	4.451	-	4.451
Bahuda	0.438	-	0.438	0.213	-	0.213
Nagavali	2.853	-	2.853	2.322	-	2.322
Subernarekha	1.193	1.115	2.308	1.193	1.115	2.308
Total	82.841	25.272	108.113	65.679	20.212	85.891

Source-State Water Plan Report

Ground Water Resources:

The natural recharge of ground water takes place through percolation from land after rain events. The quantum of dynamic ground water, which can be annually extracted, is generally reckoned as ground water potential. As per the assessment made in 2001, the total annual replenishable ground water resource of the state is 21.011 BCM, out of which 60% i,e 12.607 BCM is safe and usable.

Per-capitaWater Availability:

The per-capita water availability is reducing progressively owing to increase in population. In 2001, the average per-capita water availability (both surface and ground) in the state was around 3359 cubic meter (cum) per year, as compared to the national average of 1820 cum. With the projected future population, the per-capita water availability in the state will reduce to 2218 cum in 2051. Per-capita water availability less than 1700 cum is termed water stress condition while if it falls below 1000 cum, it is termed as water scarce condition. Though per-capita availability of water resources in our state is relatively favorable in the aggregate, the Rushikulya basin will experience a scarcity condition and basins like Budhabalanga and Bahuda will be close to scarcity condition by 2051.

Water Quality :

Water quality available in an area is as important as water quanity. The physio-chemical and bacteriological properties of the ground water determines its usefulness for agricultural, industrial and domestic purposes.

Inland districts : High iron and alkalinity contents

The ground water is alkaline in nature in Phulbani district. Nearly 87% of the water is found to be of good quality. In Korapur district ground water contents less than 950ppm of dissolved minaral water, which is satisfactory for domestic, irrigation and most industrial uses. The water analysis in different blocks show that the pH value ranges from 5.8 to 8.7, conductivity from 0.12 to 2.18 micros/cm and total dissolved solids from 112.5 to 1150.

STATE WATER BALANCE (Unit - million cum)

Demand	Surface water		Ground water	
	2001	2051	2001	2051
Domestic	798	1202	1198	1803
Agriculture	18000	40000	4688	9408
Industry	606	1750	100	200
Environment	21000	21000	8400	8400
Others	100	200	100	200
Total	40504	64152	14486	20011
Water available	70000	70000	21000	21000

Note: Water demand is approximate environment demand has been taken as 30% for surface water and 40% of ground water.

Hardness: Water is generally considered soft up to 60ppm, moderately hard between 60 and 120ppm and hard above 120ppm. Calcium and magnesium salts are the principal constituents causing hardness of water.

Chloride : Gives a noticeable test at 250 to 300ppm when present as sodium chloride in the ground waters of Ganjam, Puri and Balasore, the chloride concentration is found to content 1200,2000 and 887.7ppm respectively against the recommended standard of 1000ppm for safe drinking water. Chloride

Drinking Water : The Elixir of Life

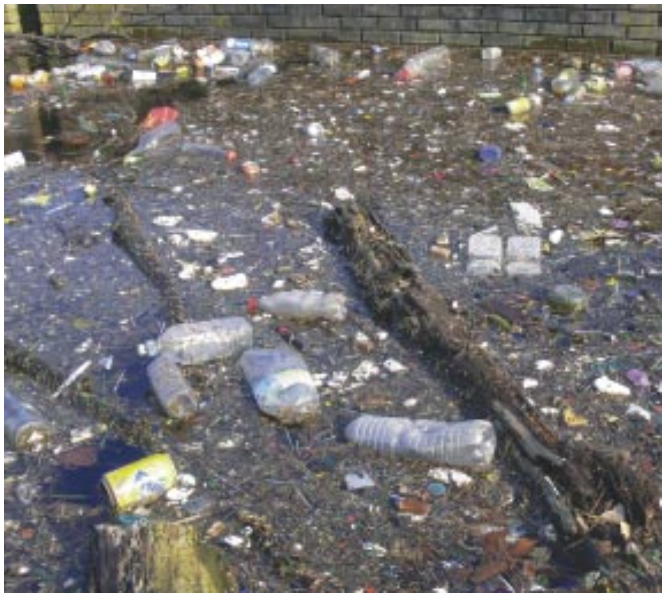
Orissa's drinking project was initiated in all most all blocks of Orissa with the aim of bringing about a general change in the health situation in the project area. It also experimented and implemented a maintenance system called the two tire maintenance, as an integreated part of project. As fresh water supplies are further stretched to meet the demands of industry, agriculture and an ever-expanding population, the shortage of safe and accessible drinking-water has become a major challenge in many parts of the world. In the wake of several major outbreaks involving food and water, there is a growing concern for the safety and quality of drinking-water.

tends to accelerate corrosion of tubwells, pipes, boilers and other fixtures. Also it is injurious to crops when present in excessive quantities.

High salinity : Some parts of Balasore, Cuttack, Ganjam and Puri districts suffer from high salinity in the ground water. The TDS value in parts of Basta, Balasore sadar and Basudevpur is found to be of the order of 2287 to 3346ppm. In many blocks of Cuttack district fresh water is found at great depth. In Puri district the quality of ground water available varies from one place to another. There is a gradual deterioration a quality of ground water in the shallow aquifiers towards sea.

Pollution Threat :

The greatest problem of surface water today is pollution from industries, mines, agricultural fields and domestic sources rendering the water unfit for any practical purpose.



Waste water from domestic sources generally contains many organic and faecal matters along with disease carrying coliform. They are mostly biodegradable but some organic substance like linear alkyl sulphonates present in detergents, are not so. Industrial waste water is likely to contain various types of pollutants depending upon the industrial process. Some of them are toxic and non-biodegradable. The non point source of pollution consists of runoff from agricultural fields etc. containing large quantities of chemical fertilisers, pesticides and faecal matters. Multi purpose river valley projects and mega dams have from the

beginning of the last century been considered as an answer to increasing demands of power, irrigation and flood control. Experience, however, has proved otherwise and man is still learning the hardway that instead acquiring endless benefits, dams have more often than not induced disasters that crucially out weigh the benefit it provided. It is in this contest that some of the river valley projects of Orissa are reviewed. This is an object lesson where by science and technology can be oriented towards environmentally sustainable programmes in the year to come.

Surface Water Development in Orissa :

Surface waater development for various uses is an age old pratice. The old Orissa canal system was built as a sequel to famine of 1866. Although Hirakud Project and Hiradhabati Project were started before the commencement of plant development, both these projects, were included in the first plant in addition to this works of Mahanadi delta and Salandi Project were taken up during this period. Six medium irrigation projects namely Salki, Dhanei, Budhabudhiani, Salia, Derjang, Ghodahada and three major irrigation projects of Mahanadi Delta stage-II, Hirakud stage-II and Salandi were taken up during second plan extending for the first time the activities of major and medium irrigation to Dhenkanal, Phulbani and Keonjhar districts.

Ground Water Development :

Provision of irrigation facility which is essentially required for the improvement of agriculture is dependent on surface and ground water resources. The ground water potential of the state has been estimated as 23.279 lakh hect.mt. and by now all types of irrigation wells have created irrigation potential only for three lakh hectors. The vast unexeploited ground water potential can be meaning fully utilised for the drought prone and backward areas.

Water Conservation:

The Government of India has formed various water management systems and authorities in India. These include Central Water Commission, Central Ground Water Board, National Water Development Agency, National Projects Construction Corporation Ltd. etc. for efficient water resources management. The policies thus formulated include Irrigation Management Policy, National Policy Guidelines to allocate water resources like rivers flowing through multiple states, National Commission for Integrated Water Resources Development Plan, Water Information Bill, River Basin Organization Policy, and many more. Various water reservoir projects were also taken up by the Ministry of Water Resources like construction and management of dams on various rivers.

The Indian government provided the masses with adequate water supply but the management of the water supply systems wasn't undertaken efficiently this has resulted in deteriorating condition of the water supply network. Thus majority is forced to pump out ground water to fulfil the water requirements that has in turn created a huge drop in the ground water levels.

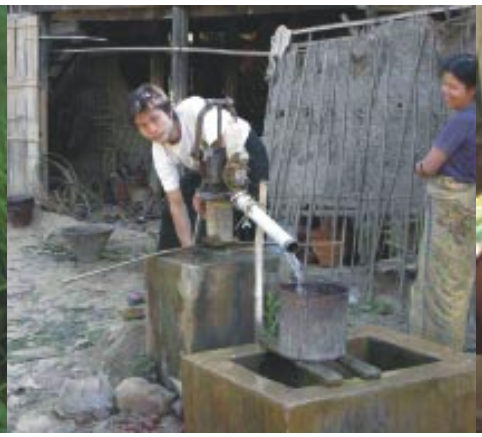
Thus an effective strategy for water conservation is the need of the hour. The steps taken in this regard include water treatment plants, water pollution control so as to keep the water resources safe for other usage, careful scrutiny of water supply division and projects. The water supply department by adopting timely conservation methods can help solving the water shortage problem in India and deal with the ongoing water crisis in India.

Rainwater harvesting can also provide a solution to the water crisis in India. Certain areas in India receive plenty rainfall and thus creating huge rainwater harvesting water tanks can help is accumulation of natural water and then after some treatment can be utilized as a drinking water substitute.

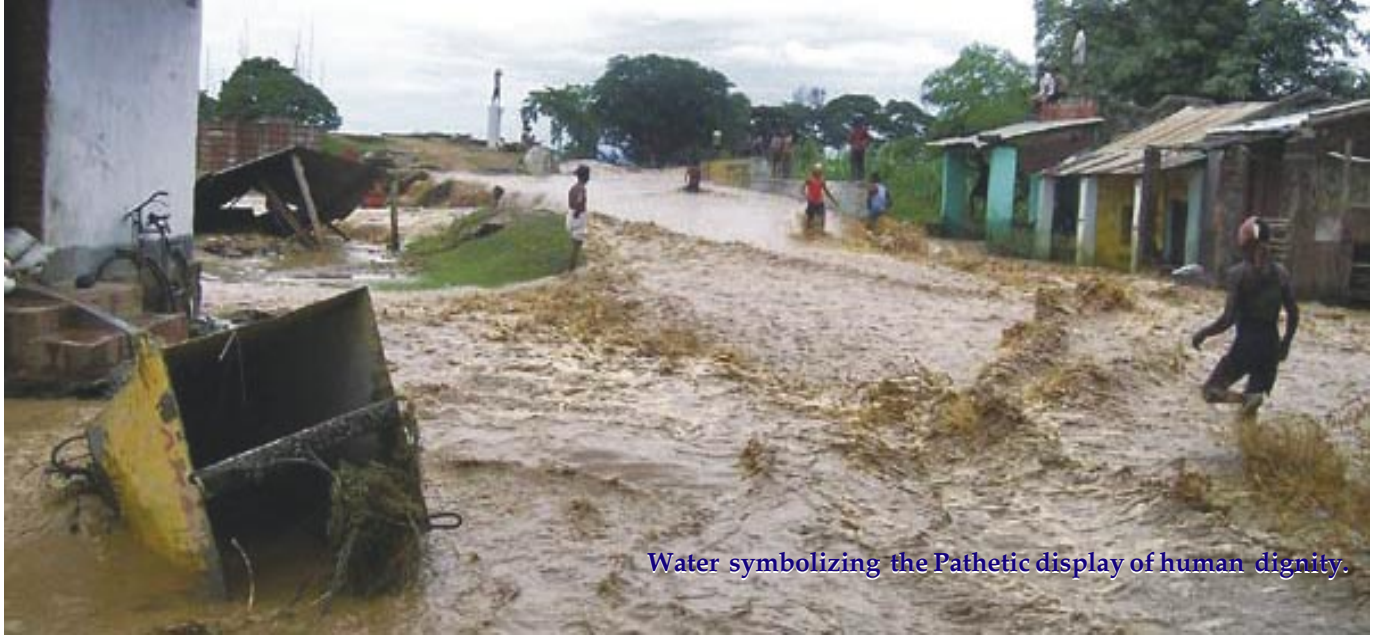
The State Water Policy :

The State of Orissa adopts the following order of priority in water allocation in tune with the National Water Policy, 2007:

(a) Drinking water and domestic use (human and animal consumption)
(b) Ecology
(c) Irrigation, Agriculture and other related activities including Fisheries.
(d) Hydro Power
(e) Industries including Agro Industries.
(f) Navigation and other uses such as tourism.


In order to uplift the standard of living, water development is perhaps the single most bulwark against the eradication of poverty. But such developmental activities should be environmentally sustainable.



Water symbolizing the Pathetic display of human dignity.

For Subscription & Query; Please Contact to :

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