RIVER BASIN

TUNGABHADRA

[INDIA]

SCHEDULE A
ASSESSMENT OF RIVER BASINS (RBs) IN SOUTH ASIA

Sr. No.	Details	Response
1	**Physical Features - General Information**	
1.1	Name of River basin (also indicate regional names);	Tungabhadra (it is formed by the confluence of rivers Tunga and Bhadra in the state of Karnataka). In ancient times, it was known as the Pampa River.
1.2	Relief Map and Index Map of RB with Country/ State/ Province boundary marked to be attached.	Refer Annexure 1
1.3	Geographical location of the place of origin (Country/District)	The Tungabhadra is formed north of Shimoga at an elevatibn of about 610metres by the union of twin rivers, the Tunga and the Bhadra, mhich rise together in the Western Ghats at an elevation of about 1,198 metres
1.4	Area (in Sq. Kms.),	It has a drainage area of 47827 square kilometers (Source : Integrated Hydrological Databook, Central Water Commission, 2006) At some places, the area is staed as 71 417 km2 Source:www.striver.no/river_bas_001.php

1.5	Population (in Millions); Name of population centers/ Cites (duly marked on the map: refer 1.2) having Population - (a) More than 0.5 Million - 1 Million	Data not found
	(b) More than 1 Million – 10 Million	
	(c) More than 10 Million	
1.6	Approximate areas of upper regime, middle regime and lower regime;	Note on the course of the river: The Tungabhadra River is formed by the confluence of two rivers, the Tunga River and the Bhadra River which flow down the eastern slope of the Western Ghats in the state of Karnataka.[2] It then takes a northeasterly direction through rugged ridges formed by boulders piled on ancient granite outcroppings over the elevated plateau that dominates peninsular India, the Deccan Plateau.(Source: Wikipaedia).The granite outcrops slowly disappear as the river flows south and the land opens into a long, broad plain ending at the rising slopes of the Sandur hills, rich in iron and manganese, beyond which is the town of Hospet. A dam, the Tungabhadra Dam, was constructed at Hospet in the middle of the 20th century to harness the river water, aiding the growth of agriculture and industry in this region. [5] The Tungabhadra River then flows east, joining the Krishna in the Andhra Pradesh state. From here the Krishna continues east to empty into the Bay of Bengal.

		The wedge of land that lies north of the Tungabhadra River, between the Tungabhadra and the Krishna, is known as the Raichur Doab.
1.7	Country and States (Province) in which the basin lies (indicate % area covered);	It flows for a distance of 293 km. in the State of Karnataka.
2	**Hydrological and Land use Features**	
2.1	Average annual rainfall (in mm);	Mean annual rainfall in the Tungabhadra basin is 884 mm. (NIH, 1992).
2.2	Maximum-minimum temperatures in Degree Centigrade	Average temperature: around 26 degrees Celsius
2.3	Average annual yield (discharge) of water in Cubic Meter and the average yield for last past five years	Average annual discharge of Tungabahdra at its confluence with Krishna is 14 700 million m3
2.4	Major tributaries	The Varada and the Hagari are its important
2.5	Percentage shares of major water uses & Surface and groundwater abstraction in percentages-Convert into Table (a.) Agriculture,	Data not found
	(b.) Industries,	D N A
	(c). Domestic,	D N A
	(d). urban,	D N A

	e). environmental flows.	None
2.6	Major cropping pattern	The major crops grown are paddy, jowar, sugarcane, cotton and Ragi (millets) **Source:** http://www.striver.no/river_bas_001.php
2.7	Cultivable area under irrigation	Data not found, though it was noted that most of the irrigation is dependent on voluntary and dispersed water impounding
2.8	Cultivable area not under irrigation	D N A
2.9	State other Water Uses- eg. Navigation, power, recreation etc.	Tungabhadra hydroelectric project is mainly constructed for generating electricity
3	**Ecosystem Features**	
3.1	Agro-climatic zones	The upper catchments are characterized by undulating terrain, much higher rainfall, middle portion of the basin has much lower rainfall, drought conditions, not so undulating terrain, mainly plains**(Source:** Tungabhadra basin: Issues: *K. J. Joy, Suhas Paranjape, Seema Kulkarni and Peter Mollinga)*
3.2	Major sub ecosystems (zoogeographical zones)	Data not found
3.3	Major soil types	Black cotton soil, red soil and sandy soil (This data pertains to Andhra Pradesh. Source: "GIS BASED RURAL DEVELOPMENT PLANNING AT DISTRICT AND SUB-DISTRICT LEVEL", Dr. J . Adinarayana

3.4	Sources of Pollution, with data indicating quantum and/or severity.	1. Kudremukh National Park (latitudinal range 13°01'00" to 13°29'17" N, longitudinal range 75°00'55' to 75°25'00" E in Chikmaglur district of Karnataka, wher the rivers Tunga and Bhadra originate. It is the largest declared Wildlife Protected Area (600 km≤) of a tropical wet evergreen type of forest in the Western Ghats. The Western Ghats is one of the twenty five hot spots identified for bio-diversity conservation in the world. Kudremukh National Park comes under the Global Tiger Conservation Priority-I, under the format developed jointly by Wildlife Conservation Society (WCS) and World Wide Fund-USA. The ecological balance of the park is thretened by the Kudremukh Iron Ore Company Limited (KIOCL), a government run company which mines iron ore from the Kudremukh hills.
3.5	Brief information about the delta region of the basin (area, location, major urban centers in the delta, etc.)	The basin does not form a delta, but meets Krishna river in Andhra Pradesh.
4	**Water Quality**	
4.1	Prevailing water quality standards (e.g. Class I, II, III. etc, indicating permitted uses)	In the towns of Harihar and Devengere, the water is severely polluted This can be attributed to pollution by industrial units as well as mercury based insecticides and pesticides used by paddy farmers. On several occasions, water supply to these towns had to be halkted for some days and the polluted water had to be flushed onwards by

		dams releases **. (Source:** The Hindu, 2 May, 2006, http://www.hindu.com/2006/05/05/stories/2006050502910300.htm)
4.2	Stretches (along the River) in Kms. with water quality classes indicated (may be marked on the map)	Data not found
4.3	Sources of Pollution, with data indicating quantum and/or severity.	Indicative *Source: Central Pollution Control Board:* In Karnataka, the Harihar Polyfibres Ltd., at Harihar in Dharwad district discharge their wastewaters into the river Tungabhadra. The wastewater is generally treated but still the residual BOD present in the treated effluents adds significant quantities of organic loads into Tungabhadra. Community wastes from Harihar town are also discharged into the river without any treatment. Part of the Davangere wastewater, is also discharged into the river in the same reach. The Bhadra River in Karnataka is also affected badly due to discharge of industrial effluents from M/s Mysore Paper Mills, Visveswariah Iron and Steel Limited. Two units of Gwalior Rayon Silk Manufacturing (Weaving) Company Ltd (Grasim) are located on its banks in the Dharwad district of Karnataka. Together, the whole industrial complex generates approximately 33,000 cum of effluents. (Source: www.rainwaterharvesting.org/Crisis/river-krishna.htm)

4.4	Prevailing abatement techniques e.g: ETP, STP, legislation, etc.	D N A
5	**Current status of the resource development & potential for development**	
5.1	Water availability: a. Per capita water availability (in lpcd)	In rural areas, the per capita water availabiity is as low as 30 lpcd. (Source: Water and Population Dynamics in a Rural Area of Tumkur District, Karnataka State, C. Ashok Kumar, Development Alternatives,K.C. Malhotra, Indian Statistical Institute ,. Raghuram and Manjulika Pais, Development Alternatives, 1998)
	b. Per hectare water availability (in Cubic meters for cultivable command area):	Data not found, though it was noted that most of the irrigation is dependent on voluntary and dispersed water impounding
	c. Availability of environmental flows (Current reserve, if any):	A project on IWRM of Tungabhadra basin is looking at the environmental flows requirements of the basin For more details, please refer to : http://www.striver.no/news.php?read=31
	d. Availability of ground water/ Average annual ground water abstraction/recharge.	Though precise adta could not be found, many references have stated the deteriorating groundwater levels due to over abstraction Source: www.hindu.com/2004/05/16/stories/2004051609210300.htm
5.2	Structures: a. Major dams/barrages (with utilization categories):	Tungabhadra hydro electric project near Hampi with a capacity of 99 MW (Note: Tungabhadra reservoir has been constantly losing its water storage capacity over the decades due to accumulation of mud due to mining, dust,

		soil erosion, debris, much to the concern of the governments. Source: http://www.striver.no/river_bas_001.php). For more details, please refer to: http://waterresources.kar.nic.in/salient_features_tungabadra.htm
	b. Proposed dams:	No big dams are proposed for the basin
	c. Live storage of major dams:	Gross Storage of all the major projects: 3767 MCM (Source: Integrated Hydrological Databook,. Central Water Commission, 2006). Live storage pf Tungabhadra Project: 116.84 TMC (Source: Department of Irrigation, Karnataka)
	d. Live storage through proposed dams:	
	e. Inter basin transfer systems:	
	f. Any Other:	Tungabhadra river system was harnessed by the Vijayangara empire (1336-1646 AD) in the Hampi region. They built several small water harvesting structures, tanks and canals to irrigate fields Some of these canals are currently in use.(Source: http://hampi.in/sites/Tungabhadra.htm)
5.3	Command area of major dams	The irrigation potential of the Tungabhadra Irrigation project is 3.63 lakh heactres in Karnataka and 1.6 lakh hectares in Andhra Pradesh.. (Source: SALT AND WATER BALANCE MODELLING: TUNGABHADRA 'IRRIGATION PROJECT (UASD) and Karnataka Irrigation Department)

5.4	Agencies functioning in the basins: a. Public agencies/ CSOs which construct/ implement the infrastructures projects: b. Private agencies/ CSOs involved in infrastructure development	Irrigation Department, Government of Karnataka, Municipal Corporations, Irrigation department, and municipal corporations in Andhra Pradesh.
6	Existence of National/State/Provincial Laws or Notifications relating to water- Management / use/developmenfor private sector participation or for privatization of water resources	The water allocation in the basin between Karnataka and Andhra Pradesh is governed by the Krishna Disputes Tribunal. In addition the Karnatka and Andhra Water Policies also provide a framework for water management.
7	Key Issues:	1. Water Conflicts Andhra Pradesh has stated that it will file a petition in the Supreme Court to stop Karnataka from going ahead with the Upper Tunga Project (UTP). It maintains that the UTP will enable Karnataka to utilise more than its share in the Tunga sub basin, thereby seriously affecting the flow into its own projects downstream. The Tunga is a major tributary of the Krishna, and the UTP, which is a constituent of the Tungabhadra sub basin projects, is aimed at irrigating nearly two lakh acres (80,000 ha) in the partially drought-prone districts of Haveri, Shimoga and Davangere. Conflict resolution is governed by the Krishna Water Disputes Tribunal. 2. Water Pollution: Water Pollution is a major problem in the Tungabhadra Basin. Please find details in the above section.Majopr sources are industrial pollution in the

		Harhirhar- Davangere region of Karnatka, agricultural runoffs and domestic sewage. 3. Water scarcity and drought conditions in the middle regime. Serious drinking and domestic water issues affecting poor sections: both in towns & rural areas.
8	Enabling instruments- Law/ Policy/ Financial Measures for introducing IWRM in the basin	Tungabhadra Board, Twinning project: STRIVER on IWRM in Tungabhadra

SCHEDULE B ASSESSMENT OF RIVER BASINS (RBs) IN SOUTH ASIA		
Sr. No.	**Details**	**Response**
1	**Legal / Political Mandate**	
1.1	Is there any RBO? If yes, Give Name.	Though it not an RBO in the real sense of the word, the Tungabhadra Board, which is manadated to regulated and control the Tungabhadra Project , has the potential to function as an agency to rpomote IWRM . For more information , please refer to: wrmin.nic.in/cooperation/tungabhadra.htm
1.2	How has it been constituted? (Statutory/ Voluntary/ Any other form).	The Board was reconstituted with effect from 15 March, 1955 vide Notification No DW VI (4) (9) dated 10-3-1955 of the then Ministry of Irrigation and Power to vest it with more powers.
1.3	State objectives and organizational structure of the RBO in outline & enclose brochures	Functions of the Board: Regulation of supplies of water to the States of Andhra Pradesh and Karnataka in accordance with the clause IX E(1) to (5) of Final Order of the Krishna Water Disputes Tribunal (K.W.D.T) relating to the Tungabhadra Project Regulation of power from the two power houses on the right side in accordance with such rules as may be made

		in this behalf by the Board [I] Maintenance of the dam and reservoir of the project, common to both the States viz., right half of the dam and 33 spillway gates including safety aspects of the dam and spillway [I] Maintenance of the common portion of the Right Bank High Level Canal and Low Level Canal including common distributaries of Right Bank Low Level Canal and any other works common to both the States of Andhra Pradesh and Karnataka [III] Maintenance of the two power houses on the right side including renovation and refurbishing [IV] Granting of lease of fisheries in the reservoir and in the main canal [V] Proper utilization of land acquired for the purposes of the project [VI] Development of new schemes for hydro power generation on common facilities and its regulation [VII] Generation of revenue from the assets of the Board and create assets for increasing the revenue

		[VIII] Any other function incidental to or connected with the functions specified in the above clauses Present Composition of Board: Chairman (Nominated by GoI) Chief Engineer, Krishna & Godavari Basin, Central Water Commission, Hyderabad Member (Representing GoI) Financial Adviser and Joint Secretary, Ministry of Water Resources, New Delhi Member (Representing GoAP) Engineer- in-Chief, (Irrigation), Irrigation & CAD Dept., Hyderabad. Member (Representing GoK) Secretary to Government, Water Resources Department, Government of Karnataka, Bangalore.

1.4	Functioning level of the RBO (watershed/micro basin/sub-basin/basin, etc.) (eg. Upper Bhima Water Partnership, restricted to Bhima river flowing through the State of Maharashtra – A reference literature can be provided by Gomukh for comparision. 1. Does the RBO have the responsibility and technical capacity to coordinate integrated water resources planning in the basin? 2. Does the RBO have a proactive and efficient data management and information dissemination process to inform all stakeholders of basin conditions, water resource availability, and major issues?	
1.5	What are the major activities carried out by the RBO since inception?	
1.6	What are the proposed activities of the RBO?	
1.7	Details of Contact person/s (Name, designation and contact numbers, address, & emails).	
1.8	Presence of a regulatory framework wherein national or regional supra basin authority regulates the functioning of the RBO (eg.	

	Indus Commission).	
1.9	Legal/political mandate wherein stakeholders can appeal for redress/decision and conflict resolution	D N A
1.1O	Does the RBO have an appellate authority?	D N A
1.11	Is the RBO an autonomous body?	The Board is functions under the Krishna Interstate water disputes tribunal
1.12	Is it regulated by a supra basin authority, if so, how?	
1.13	Is the RBO authorized to raise capital for management and/or implementation in open market? (Please elaborate the authorization).	D N A
1.14	Does the RBO receive direct budgetary grants? (From Govt./ Statutory Bodies/ Public donations/ Any Other Agencies.)	Yes
1.15	Nature of mandate for delegation of powers and/or functions (within RBO's constitution) to the lowest possible scales so as to encourage stakeholder participation. (Kindly elaborate the mode of delegation).	No delegation
1.16	Policy of the RBO on – (i) Water allocation between users/sectors/sub-basins; and	D N A

	(ii) Procedures and processes for determining the above. (Kindly elaborate upon the above).	
1.17	Presence of Trans-boundary Water Agreement or Treaty in case of a trans-boundary basin, (and a common RBO representing the countries/provinces) (eg. Indus Treaty in case of River Indus flowing through India and Pakistan) (Kindly indicate the agreement/ treaty. Also, indicate RBOs are representing Trans boundary Basins.)	Krishna Water Tribunal Award
1.18	Presence of a 'Tribunal' appointed in case of intra basin or inter basin disputes (eg. Krishna Water Disputes Award Tribunal established between states of Maharashtra, Karnataka, and Andhra Pradesh); (Kindly indicate name & nature of tribunal).	
1.19	Is the RBO responsible for preparing Basin Management Plan. If yes, please enclose a copy	No
2	**Processes of community/stakeholder participation in the functioning of the RBO**	
2.1	Are the stakeholders from the basin included in the governing body of the RBO? (e.g.: farmers, academics, CSO representatives, etc.)	No

2.2	Elaborate the nature and frequency of public consultation initiated by the RBO (for example: Annual Public hearings, representations from individuals/public,etc.)	No consultations
2.3	Elaborate efforts at outreach/communication by the RBO.	None
2.4	Elaborate efforts made for creation of participatory platforms at minor/major tributary or watershed levels for encouraging participation .	None
2.5	Interaction of the RBO with organizations working in water management at different watershed/ micro basin, sub-basin or basin level (eg. Interaction of RBO with Water User Groups).	None
2.6	Stakeholder participation sought by the RBO for preparing Basin Management Plan	No plan prepared
3	**Conflict resolution and negotiations**	
3.1	Involvement of the RBO in negotiations between stakeholders at various levels through an appellate authority mentioned above;	D N A
3.2	Negotiation and participation encouraged at mini/micro basins for consensus building and/	D N A

	or conflict management.	

SCHEDULE C
ASSESSMENT OF RIVER BASINS (RBs) IN SOUTH ASIA

Civil Society RBOs (CSOs working in River Basin issues or those physically involved in infrastructure development and articulating / advocating a River Basin perspective maybe be considered as Civil Society RBO. Please note that some of these organisation may not be calling themselevs as RBOs. This is despite the fact that they function in most, if not all areas in which a statutorily constitited RBO opeartes)

Sr. No.	Details	Response
1.1	Constitution of the organization in terms of involvement of local action groups/initiatives, stakeholders, water users groups, and irrigation groups/ committees, traditional water groups urban and industrial users etc. are a part of the organization);	Though a community based RBO is not present, through a Twinning project called STRIVER, project is being undertaken for IWRM of the Tungabhadra Basin. For more details, please refer to :http://www.striver.no/news.php?read=26
1.2	Reflection of basin perspective in the organization's constitution/past/planned work and activities?	Striver project is specifically tailored for IWRM through a basin perspective.
1.3	Scale of work: Sub-basin/basin scale?	Sub basin: Tungabhadra
1.4	Consideration of upstream and downstream impacts of water management activities in the RB and issues like inequitable distribution of water between intra and inter sectors;	Conflict resolution is one of the main objectives.
1.5	Has the organization prepared a Basin Master(Management) Plan? Does it contain	One of the objectives is preparation of basin management plan.

	elements different from or alternative to that of the government organizations?	
1.6	Efforts taken by the Civil Society RBO to upscale the vision/activities at basin level	Multistakeholder platform of basin users has been recently constituted(January 2007) . The workshop was attended by government officials from the State of Karnataka especially from the Departments of Irrigation, Forest, Fisheries, and the State Pollution Control Board and other agencies in addition to representatives from NGOs and Farmer's groups. Please find details at: http://www.striver.no/news.php?read=25
1.7	Participation in lobbying and advocacy at appropriate levels (provincial, national, international)	