

## Urban Biodiversity Assessment: An Experiment Towards Environmental Awakening?

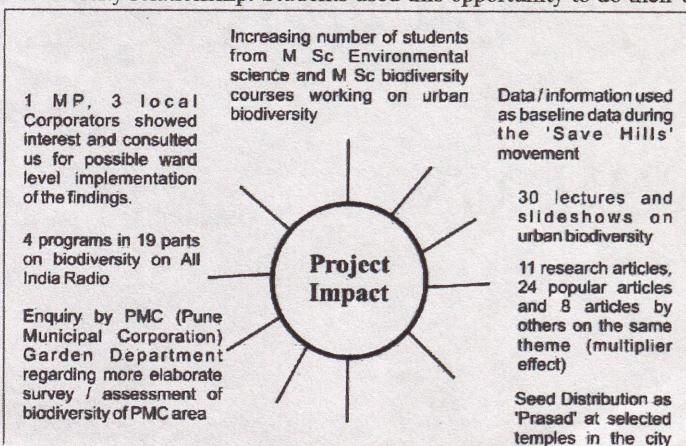
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RANWA (Research and Action in Natural Wealth Administration), a Pune based NGO active since over a decade is dedicated to research in biodiversity, environment conservation and management. It provides an open platform to students from different schools and colleges in Pune for developing their research abilities and to enrich their knowledge and understanding in the field of environment. Through activities such as weekly 'Katta' (an open forum where anybody can join and share his / her experiences and thoughts on environmental issues), Sunday nature trails in the nearby biodiversity rich areas such as hills in and around Pune city and wetlands such as Pashan lake and Mula - Mutha bird sanctuary that are situated right amidst the rapidly urbanizing parts of the city, environment education programs that include lectures, slideshows, films and activities in schools and colleges, participation in exhibitions and events related to environment, biodiversity surveys in and around Pune, publishing popular as well as research articles, etc. RANWA's student volunteers have always been becoming more and more interested in environmental studies.

Since 1998 RANWA is involved in research on urban ecosystems with focus on urban biodiversity. RANWA during 1997-2000 formed an enthusiastic group of naturalists bringing together eight college teachers, twelve undergraduate students and five freelancers from four colleges, two university departments and three NGOs and conducted a research project on documenting urban biodiversity of Pune - the second largest urban agglomeration in Maharashtra after Mumbai. The project was titled 'Pune Alive'. The ten taxonomic groups identified for assessment were - Fungi, Herbs, Trees, Ants, Butterflies, Freshwater Fish, Amphibians, Reptiles, Birds, and Mammals. After two years of data collection, referencing, consulting, group discussions and field visits, voluminous data on Pune's urban biodiversity emerged. The data were then verified, classified, and organized on the basis of habitat, taxonomic group and period. The experiment of involving college youth seemed to be successful. Findings of the project in were published in the Journal of Ecological Society as fourteen scientific papers. It was entitled 'Biodiversity Profile of an Urban Area as a Special Double Issue' (2000-2001). Later its Marathi translation 'Sajeev Pune' was published by RANWA. It was also web-published on [www.ranwa.org/punealive](http://www.ranwa.org/punealive). The special issue was acclaimed and appreciated worldwide by a number of ecologists, wild lifers, natural historians and individuals through letters and e-mails.

Teachers used this opportunity to communicate different techniques used for surveying biodiversity to their students. Student volunteers who had participated in this survey were encouraged by offering them co-authorship in the papers published and awarding a token honorarium for their voluntary efforts. These student volunteers then took up some opportunities to propose and conduct individual projects based on this study through their respective institutes. Furthermore, they also encouraged their friends to take interest and participate in similar and further studies. Some are still continuing the surveys on similar guidelines so as to develop a yearly database on Pune's biodiversity. Teachers are also helping their students to develop their skills in identification of species and methods of biodiversity documentation and behavioral studies. This survey in a way has shown a new direction of research in the field of environment. Not only at undergraduate level but students of postgraduate and PhD in environment sciences have got a good baseline for their study. Increasing number of dissertations on the Pune's biodiversity refer to this study as the basic information for understanding Pune's biodiversity. Students also used this project in different environment education programs in schools. Pune People's Biodiversity Register was an attempt to document the urban biodiversity of Pune. This collaborative activity of RANWA and Abasaheb Garware College, Pune involved college teachers and students in the process of documentation. Besides information given in the 'Pune alive', data on domesticated biodiversity and agro-biodiversity were also collected. This program also tried to study the human - urban biodiversity relationship. Students used this opportunity to do their undergraduate assignments.



### **Following were observed as after impacts of the project:**

- UNDP - GEF SGP project on Ecosystem Assessment Planning Inputs for the Northern Western Ghats with urban biodiversity as a core component.
- Indian Urban Resource Millennium Assessment by Naturalists

1992



*SECTION II*

*State wise description  
of projects<sup>1</sup>*

<sup>1</sup> Statewise description of Large Hydroelectric projects in Tripura has not been included as the only large project in the state is Gumti, which has been described in detail in Section 4.6

- Every Environment Status Report for Pune since 2002 included, discussed and referred to 'Pune Alive' data
- Government level – invitation by DCF (working plan) for discussion on conservation and inclusion of biodiversity data into future working plan which was then under preparation
- Interaction with Garden Superintendent of the PMC (Pune Municipal Corporation) regarding beautification of banks of the Mutha River. A list of useful indigenous trees was provided to the PMC and many saplings of trees from the list were planted accordingly.
- 'Pune Alive' data partly included in the National Biodiversity Strategy and Action Plan
- Local Newspapers have been quoting the Pune alive data every now and then, whenever any urban biodiversity issue comes up
- Increased mass awareness level about biodiversity in Pune
- Increasing inquiries about developing medicinal plant gardens, butterfly gardens, bird attracting trees, eco-ponds
- Many Pune based environmental NGOs who otherwise talked / worked on country biodiversity started taking cognizance of urban biodiversity and urban environment issues and shifted their focus accordingly
- Many Puneites realized for the first time that something like urban biodiversity exists

#### **What next?**

Possible future impacts -

- Urban Biodiversity Registers (UBR) – Ward level data on biodiversity can be collected for better implementation of urban plans
- School Biodiversity Registers (SBR) – School children can be involved in the biodiversity documentation at different levels such as biodiversity in the school campus, residential colonies and gardens
- More Medicinal Plant Gardens
- More Butterfly Gardens – Increased awareness amid people would trigger plantation of medicinal plants and butterfly attracting plants around houses, on terrace / balcony gardens, farm houses, in the campus of educational institutes and in and around industrial area.
- Complete Protection To Hills And Hill Biota Around Pune
- Purification, Restoration and Beautification of Pune's Rivers – More and more citizens and action groups will become concerned about protection of rivers in Pune.
- Incorporation of Biodiversity Data into Urban Planning
- Increasing use of native species for reforestation and afforestation by PMC Garden Department, Forest Department, corporate houses and private farm houses.

We had never envisaged the all out and wide spread impact of this. But the multiplier effect gave us an opportunity to document the details of impact.

#### **Role of Urban Biodiversity Studies in Education:**

- Provides better opportunity to learn about biodiversity as students need not have to go far from cities for watching biodiversity
- Schools can prepare biodiversity registers with the help of student volunteers who can document biodiversity around their houses
- It would be easier to teach and learn different types of ecosystems and animal and plant ecology in the urban areas
- Education towards Sustainable urban future can be achieved through urban biodiversity studies in schools and colleges
- Good career opportunities for students and teachers
- We can expect change in attitude of teachers, students and their parents towards urban biodiversity and biodiversity as a whole as well
- The change in attitude and increased awareness would trigger biodiversity conservation and sustainable urban development

## 2.1

# Hydroelectric Projects in Arunachal Pradesh

### SECTION 2: STATE WISE DESCRIPTION OF PROJECTS'

#### 2.1 Hydroelectric Projects in Arunachal Pradesh

Arunachal Pradesh has 37 power plants ranging from 5KW to 4500 KW with a total installed capacity of 23.8 MW and firm power of 16.5 MW. Against firm generation of 16.5 MW, the peak requirement to load centres covered by the network of transmission and distribution system is 75 MW. The short fall is therefore 58.5 MW. However most of the peak demand is met out of diesel generation. In the state, 94 diesel generating stations ranging from 10 KW to 500 KW capacity are functioning with a total capacity of 18.5 MW. There are another 21 projects with total installed capacity of 76.25 MW targeted for completion in 9th plan to bridge the demand supply gap. is the state The state has the highest number of high head mini and micro hydel projects in India. (Arunachal Pradesh state website)

This was the power scenario of the state prior to the commissioning of the 405 MW Ranganadi HEP in 2002

Pre-feasibility Reports for 42 projects in Arunachal Pradesh have been prepared under 50,000 MW Hydroelectric Initiative to generate a total of 27293 MW. The Prime Minister had launched a programme for preparation of these reports 24.5.2003. The scheme was formulated by Central Electricity Authority (CEA) and sanctioned by the Ministry of Power on 31st March 2003 at a cost amounting to Rs. 24.95 crores. On the facing page are listed 42 projects for which the pre-feasibility reports have been completed.

Listed below are the projects being actively proposed in the state or have been granted clearances except for Ranganadi stage I, which has been commissioned

1. Ranganadi Hydroelectric Project. Stage I
2. Ranganadi Stage II Hydroelectric Project
3. Upper Subansiri Hydroelectric Project
4. Kamla Hydroelectric Project (Middle Subansiri)
5. Lower Subansiri Hydroelectric Project
6. Upper Siang (Upper Dehang) Hydroelectric Project
7. Siyom (Middle Siang) Hydroelectric Project
8. Lower Siang Hydroelectric Project
9. Kameng Hydroelectric Project
10. Debang Hydroelectric Project
11. Lohit Multipurpose Dam Project
12. Noa-Dehing Multipurpose Dam Project

13. Demwe Power project

14. Etalin Power project

15. Dikrong Hydroelectric Project

#### 1. Ranganadi Hydroelectric Project. Stage I

**Region:** Arunachal, Lower Subansiri district, near Ziro

**Lat/ long:** 27° 20' N, 93° 49'E

**Physical dimensions:** built to generate 405 MW, (3X135) the project comprises of a 60 m. high concrete dam. This diversion dam located at Yazali on river Ranganadi, diverts the water into the Dikrong river through a 10.07 km long tunnel. The power house is located at Haj on the left bank of river Dikrong.

**Implementing agency:** North Eastern Electric Power Corporation (NEEPCO)

**Total cost:** 1455.45 crores (July 1999). One part of the funds were provided by the North Eastern Council (NEC). Sources of funding specified on the NEEPCO website include loan from Government, LIC, PFC along with money from equity and bonds (<http://www.neepco.com/>).

**Status:** All three units of the project were completed by March 2002. With the commissioning of this project it was reported that the Northeast became a power surplus region. And it is hoped that the region will be able to export power to elsewhere in India and to neighbouring countries like Bangladesh.

As per the PIB release on March 28, 2002, annual energy generation of 1876 Gwh would be distributed to the 7 constituent states of the Northeast in accordance to the formula of sharing of power from Central Sector projects with 12% free power to the state of Arunachal Pradesh.

Evacuation of power from Ranganadi is being taken up by the Power Grid Corporation through a 400 KV transmission system for distribution in all the northeastern states and connecting the project with the national grid. The 12 % free power that is available to Arunachal will be evacuated by a 132 KV transmission system that was stated to be present. However, at a meeting in June 2002 the Chief Minister said, "Though 405 MW Ranganadi hydel project in lower Subansiri district has been completed and presently under trial

Methodology named to monitor urban production  
Citizen Guide / Govt officers / NGOs

About half of the world's population lives in towns and cities. In industrialized countries the proportion is even higher where more than 80% people reside in urban areas. In many third world countries the rate with which the towns and cities are growing is awfully great. In India around 40% of population lives in urban areas.

The impact of urbanization is felt not only locally but even in localities which are many hundreds of kilometers away from urban centers. Most of our cities are supplied with drinking water from dams and reservoirs located in far away places. Timber for furniture making industry in Mumbai comes directly from Assam. Delhi heavily pollutes Yamuna which influences the life of those settlements situated further downstream. The impact on the aquatic flora and fauna is even severe. Polluted air formed over an industrial town is carried away to long destinations by prevailing wind. The health of an urban area is therefore quite important for wellbeing of not only the urbanites but also for the hinterland and the faraway places influenced by the ecological footprints of the urban centers.

The status of urban biodiversity can be a good indicator of the overall health of an urban area. Urbanization is also one of the most important processes impacting the environment in general and wildlife / biodiversity in particular. Green areas within and around an urban center are vital for the whole region. Many urban habitats such as isolated hills, water bodies, remnants of previous forest, etc. are sensitive and need to be conserved. Many urban areas are vital recreational areas – e.g. Lalbaug Garden and the Cubbon Park at Bangalore. Thus consideration of biodiversity in urban planning is important both for the wellbeing of urban residents and for the maintenance of urban biodiversity. Unfortunately the existing unsupportive laws, low priority given by the city / town planners, data deficiency and general ignorance towards urban biodiversity are such that ecological knowledge cannot be well integrated into urban planning. Urban planners see urban biodiversity as an irrelevant theme, contradictory information or legal obstacle rather than something to plan for.

#### Background and Aim:

Research and Action in Natural Wealth Administration (RANWA) conducted a survey of urban biodiversity in Pune city and suburban region during years 1998 – 2000. The findings were surprising. The region was found to be quite rich in biodiversity. We tried to collect similar data for other cities – Indian and foreign alike. The data about Mumbai, Delhi and Bangalore showed that these urban areas too were equally rich in urban biodiversity. Cities abroad – London, New York, Moscow show similar trends. It was therefore thought that we should work further. Mere check listing of biodiversity was not enough. We need to know the changing relationship between burgeoning urban areas and depleting biodiversity. We also realized that conservation of urban biodiversity should have been the ultimate goal.

#### How to conserve urban biodiversity?

A very little work has been done on the urban wildlife, urban biodiversity and urban ecology. Whatever references are available, are from the western cities – mostly from North America and Europe. Here also large metropolitan areas have been covered. Most of the third world is not aware of the rich biodiversity found in their cities and towns. Barring exceptions, most of these urban areas do not even have preliminary data – checklists, hand-lists, inventories, etc. about their city biodiversity. This stands out against the better coverage of wild areas – forests, hills, wetlands, coasts, etc. data deficiency is therefore a major hurdle towards the management and conservation of city biodiversity. Another major hurdle is that here is not proper proven methodology especially for urban areas for collecting biodiversity data. Various techniques and methodologies exist for monitoring wildlife from forests, grasslands, deserts, and aquatic and agro-based habitats. But there is hardly any methodology developed for monitoring the urban biodiversity. One can easily monitor plants or birds assemblage along with its various aspects – abundance, diversity, population, etc. with the help of quadrat or transect technique. But the problem is how to use the same technique for urban areas. Various point count techniques have been developed to census birds – roost count, nest count, egg count, waterhole count, etc. How to modify and adapt these techniques to suite the studies in urban areas? Height of a tree can be measured by various techniques that require a lot of open and free space around the tree for maneuvering. Trees in urban areas are in congested localities and may not provide enough open space around them while measuring height. Under such conditions we cannot even modify the existing techniques. We will then have to think of simple alternate techniques. How about comparing the height of the tree with an adjoining multistoried building or an electric pole? There are many problems with respect to urban biodiversity. The menace of birds around airports, frequent electrocution of fling foxes on electric wires, short circuiting at transformers due to erring crows and subsequent blackouts, further weakening on old walls and structures due to Ficus trees growing in the cracks in them, menace of blue rock pigeons in factory building and industrial sheds to name a few. Studying these problems and suggesting solutions would be a part of the present project. Most of the traditional methods of biodiversity measurement and estimation are aimed at researches in ecology or taxonomy and not particularly well suited for planning proposes.

The best way to study the urban biodiversity is to divide the urban region into convenient habitat types. It is not easy. One can divide a wild area into convenient habitat types – forest, scrub, grassland, desert, etc. It is also possible to further subdivide the forest into say evergreen, deciduous, thorn, etc. In case of urban habitats classification is not that easy because of its manmade, complex, steeply intergrading dynamic nature. How can one name an urban green patch? – A city park, woodland, a well wooded compound, a garden, a green backyard or a plantation?

RANWA will be working on this project with this background. Since the present phase is the planning phase some of the major objectives are –

To develop a roadmap for implementing the final project (developing draft methodology manual for urban biodiversity monitoring)

To identify partners for the next phase of the project

S.No.	Project	Consultant	Installed Capacity (No. of units x MW per unit)	Estimated Cost (in Rs. crores)
1.	Agoline	NHPC	175 MW (3x 125)	2293.62
2.	Amulin	NHPC	460 MW (3x140)	2979.45
3.	Ashupani	NHPC	30 MW (2x15)	570.78
4.	Attunli	NHPC	500 MW (4 x 125)	2725.26
5.	Badao	NEEPCO	120 MW (3 x4)	443.98
6.	Bhareli-I	NEEPCO	1120MW (8 x 140)	3372.45
7.	Bhareli-II	NEEPCO	600 MW (5 x 120)	1698.35
8.	Chanda	NEEPCO	110 MW (4 x 27.5)	466.06
9.	Demwe	NHPC	3000 MW (12 x 250)	9539.40
10.	Dengser	NHPC	552 MW (4 x 138)	3945.09
11.	Dibbin	NEEPCO	100 MW (2 x 50)	371.52
12.	Duimukh	NHPC	150 MW (3 x 50)	2420.46
13.	Elango	NHPC	150 MW (3 x 50)	1503.07
14.	Emini	NHPC	500 MW (4 x 125)	3067.20
15.	Emra-II	NHPC	390 MW (3 x130)	2564.5
16.	Etabue	NHPC	165 MW (3 x55)	1208.39
17.	Etalin	NHPC	4000 MW (16 x 250)	14069.14
18.	Hirong	NHPC	500 MW (4 x125)	2072.78
19.	Hutong	WAPCOS	3000 MW (12 x 250)	7792.29
20.	Kalai	WAPCOS	2600 MW (10 x 260)	6637.67
21.	Kameng Dam	NEEPCO	600 MW (5 x 120)	2264.00
22.	Kapakleyak	NEEPCO	160 MW (4 x 40)	463.52
23.	Kurungl&II	NHPC	330 MW ( 3 x 110)	2985.04
24.	Mihumdon	NHPC	400 MW (4 x100)	2700.33
25.	Mirak	NHPC	141 MW (3 x 47)	1320.75
26.	Naba	NHPC	1000 MW (4 x 250)	4399.89
27.	Nalo	NHPC	360 MW ( 4 x 90)	2922.14
28.	Naying	NHPC	1000 MW (4 x 250)	3016.96
29.	Niare	NHPC	800 MW (4 x 200)	3498.55
30.	Oju-I	NHPC	700 MW (4 x 175)	3526.28
31.	Oju-II	NHPC	1000 MW (4 x 250)	3492.99
32.	Pakke	NEEPCO	110 MW (2 x 55)	480.45
33.	Papu	NEEPCO	200 MW (2 x 100)	646.8
34.	Phanchung	NEEPCO	60 MW (2 x 30)	282.43
35.	Ringong	NHPC	150 MW (3 x 50)	1211.06
36.	Sebu	NEEPCO	80 MW (2 x 40)	371.4
37.	Simang	NHPC	90 MW (3 x30)	1028.34
38.	Talong	NEEPCO	300 MW (3 x100)	891.04
39.	Tarangwarang	NEEPCO	30 MW (2 x 15)	134.54
40.	Tato-II	NHPC	700 MW (4 x 175)	2608.60
41.	Tenga	NEEPCO	600 MW 4x 150)	1602.30
42.	Utung	NEEPCO	100 MW ( 3 x 33.3)	488.1

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To decide the role of every partner in the upcoming phase

The partnership may be formed on the basis of data sharing, sharing of knowledge, helping in field studies, organization of various themes based workshops for capacity building of stakeholders, training for volunteers, for development of methodologies meant for monitoring urban biodiversity, for conservation of urban biodiversity, for rising awareness of the citizens about the urban biodiversity, etc. Such workshops may be organized independently with the technical support from RANWA or may be organized jointly.

We therefore appeal all those individuals, researchers, nature lovers, wild-lifers, NGOs working on urban issues mainly with respect to urban biodiversity / urban wildlife / urban ecology for cooperation and collaboration so that the best methodology manual for monitoring our urban biodiversity may be developed – a task entrusted on us by the UNDP - GEF through CEE.

run, but due to non-availability of a 132 KV transmission grid, power cannot be transferred to other power hungry regions. In the given situation, Ranganadi project will therefore cover only four of the 15 districts of the State.

According to the Inspection Notes of Atul Sinha, Secretary, DONER dated 9<sup>th</sup> January 2003, "At present, the NLCPR<sup>1</sup> funded 132 KV Ziro -Along Transmission Line being built by Power Grid Corporation of India Ltd. (PGCIL) is progressing well. However, there is no proposal from the State Govt. as yet, for the Ranganadi - Ziro 132 KV Transmission Line - in absence of this link, the Ziro - Along 132 KV line would not serve any purpose. I was informed that the PGCIL are already working on the 132 KV Ranganadi - Ziro Transmission Line with the understanding that it will receive NLCPR funding. (<http://northeast.nic.in> Secy\_tour\_Arunachal\_Assam\_08012003.pdf)

In October 2002, the state commenced the sale of 50 MW of power to Punjab, Haryana and Delhi at a rate of 1.95 per unit, via the Power Trading Corporation. The contract will yield Rs 65 crore to the state exchequer. (Project monitor, 16-31 October 2002)

### Ecological impacts

During construction two quarries on the left bank of the river seemed abandoned. If these quarries were left open without being rehabilitated, it is possible that the flow of loose soil into the river has increased.

Plantations are to be raised on 566 ha. of degraded forest land to compensate for the 281.18 ha. of forest land that was diverted for the project use.

The project is bound to have impacts on the characteristics of both Ranganadi and Dikrong rivers due to inter basin transfer. There are also likely to be impacts due to the transmission lines to be laid to evacuate power. The extent of these and many other impacts needs to be studied.

The ecological impacts identified by project authorities are not known as the Environment Impact Assessment (EIA) report was not accessible at the time of compiling the dossier.

A study of the EIA reports and conditions for clearance of the project will help to understand if all the impacts of the project had been looked into and if

mitigation measures were accordingly planned by the project authorities and the Ministry of Environment and Forests (MOEF), which is incharge of granting environmental clearance to hydel projects.

The Catchment Area Treatment (CAT) plan also needs to be studied to understand the manner and extent of treatment that the project authorities along with the state departments propose to undertake. If the catchments are under habitation, then it will be impossible to undertake such activities without the co-operation of the local communities.

It is also not known if the project authorities have worked out an appropriate and a detailed disaster management plan.

### Social impacts

There is very little information available on the social impacts as identified by the project authorities, as the EIA report was not accessible at the time of compiling the dossier.

The NEEPCO website states that the Ranganadi power project has "helped in providing employment opportunities to the local people. More than hundred local educated youths are employed while thousands of others are engaged in contractual jobs and in the running various business establishments in the project like a shopping complex developed by NEEPCO. The project site is today a complete township with facilities like banking, postal and tele- communication services. The lifestyle of people along the Kimin-Ziro road has changed drastically. Today they are getting electricity free of cost supplied by NEEPCO, and their children have started going to school. There has been no direct displacement of local people due to the project. About 34 families, who were affected due to the project have been rehabilitated with compensation package at Somebasti and Rupbasti villages".

There is no mention of the probable impacts in the downstream regions of both the rivers involved in this project. Changes in the pattern and quantity of water flow downstream of the dam site occur when a river is impounded and these changes affect the livelihoods of people depending on the river. In his paper on Environmental Impact Assessment in Northeast India, Dr V. T Darlong states that the impacts of sedimentation due to one specific project in the Eastern Himalayas, was visible upto 100 km downstream in the form of decreased fish catch, which in turn affected the fishing community.

<sup>1</sup> NLCPR is Non-Lapsable Central Pool of Resources, a special resource pool for the Northeast as recommended by Planning Commission.