Special Note – II **on 'Odisha Floods 2011' from *Water Initiatives Odisha (WIO)***

24th September, 2011

Different Designs, Same Management

'Did we manage the Rengali dam the way we managed Hirakud?' asks Water Initiatives Odisha, as it brings a special note on this issue in response to the latest spell of the flood disaster in northern Odisha Rivers.

The latest spectre of floods over Brahmani and Baitarani has once again brought the Dam Operations and Management systems of the state into question. This time the focus goes to the Rengali dam. Before going further to the discussion, we would like to bring to your notice the water storage level that was maintained in the Rengali dam on select dates as against the recommended Rule Curve for that dam.

Select Date	Recommended Maximum Reservoir and Minimum Limits (by Rule Curve)	Level at which the Reservoir was kept
1st July	109.72 M / 109.72 M	114.84 M
1st August	115.85 M/ 115.85 M	114.91 M
1st September	122.50 M/ 121.95 M	122.36 M
7th September	122.50 M/ 121.95 M	122.87 M
14th September	122.50 M/ 121.95 M	123.54 M
20th September	122.50 M/ 121.95 M	123.66 M
21st September	122.50 M/ 121.95 M	123.55 M
22nd September	122.50 M/ 121.95 M	123.56 M
23rd September	122.50 M/ 121.95 M	123.56 M
24th September	122.50 M/ 121.95 M	124.39 M

As can be observed from the above, even as warnings of depression/low pressure were coming in (and in fact that has historically brought rain at this time of the year over Brahmani and Baitarani river basins), the Reservoir was kept consistently at a higher level. On 23rd September, when we sent out our 8th Flood Update for this year, the Govt. of Odisha's Water Resources Department's website shown the Rengali Reservoir Level at 124.15 M, that's 0.65 M above the recommended FRL, which was 105.4%! Even though Rengali, unlike Hirakud, is touted as a dam whose design has a specific space devoted above the designed water level for the project, the multi-functionality of the project makes it controversial each time floods have come. Further, the incomplete canals have also added to the woes as water from the reservoir could not be drained out faster than envisaged. At the crux of it, the dam authorities should never have allowed so much of water to stay in the reservoir till the last moment. This is how we managed our reservoir and let the flood devastate about half a million people by design. Another thing that comes to light with this is when we note that , on 23rd September, the OHPC site, which has been quoted in the above table, shows a lower actual reservoir level than what the WR department records. ***This shows how effective is the coordination among various departments and institutions responsible for flood management in our river basins.***

Flood is a regular phenomenon in Brahmani and Baitarani as heavy inundations take place causing severe damage. Documents from govt. departments tell us that floodings can be reduced by temporary storage

of water behind Rengali dam on Brahmaniriver, which controls roughly some 50% of the total catchment area draining to the delta. To use the dam for flood mitigation, floods are being forecasted based on real-time information of rainfall and discharge in the two basins. The lead-times for forecasting at present are limited as only the contributions of the basins in Orissa are covered by the forecasting system. This includes the entire Baitarani basin and Brahmani river below Panposh. Upstream of Panposh, the Koel and Sankh rivers drain, which constitute over 75% of the catchment area controlled by the Rengali dam. Experts have been viewing that by expanding the flood forecasting system to the upper reaches of the Brahmani basin lead times can be extended and knowledge about the flood volumes to be temporarily stored at Rengali can be improved considerably. We really don't know what is being done in that regard by the government. ***Time the government releases a White Paper on the flood management to clear all the doubts of the citizens of the state.***

From a document of the CWC we found out that the shortfalls of the present system were realised long time back. In August 1992 the Central Planning Unit, Irrigation Department, Orissa finalised a feasibility study on "Telemetry System for Rengali Dam Project". In this study it proposed a communication system for real-time collection of hydro-meteorological data in the Brahmani basin which could cover such an expansion to improve the flood forecasting. This was further taken up in World Bank's Staff Appraisal Report (SAR) of the Hydrology Project (July, 1995). In the SAR activities related to the improvement of flood forecasting in Brahmani basin were covered under the heading: "Improvement to Real-Time Water Resources Management", with a total budget of Rs.24.7 million. ***It's also time that the Government tells us what happened to this study and its recommendations?***

Coming back to the Rengali dam on river Brahmani, it is a multipurpose dam to store water for irrigation and for the production of hydro-electric energy and to mitigate floods. This dam is a gravity masonry type of dam with a length of 1,040 m. It has a 464 m long overflow section with an Ogee type spillway consisting of 24 gates. The spillway capacity is nearly 47,000 m3/s at a maximum reservoir level of 125.4 m. The installed hydropower capacity is 5x50 MW. The dam controls a catchment area of over 25,000 km2.

As per the Central Planning Unit 1992 guidelines, the Rengali reservoir is guided by the following two considerations:

1. Dam safe condition: in no case the safety of the dam should be allowed to be threatened. There should always be ample space in the reservoir for moderation of the incoming flood. Releases from the reservoir should be designed accurately.

2. Safe flood condition: an attempt should be made to restrict the release to safe flood conditions in the downstream area (i.e. a total inflow to the delta of less than 8,000m3/s); this should be done only if the dam safe condition so permits.

As per a document of the CWC, the first condition requires a reliable forecast of the maximum inflow volume to the reservoir, so that under all conditions the reservoir level can be kept below an MRL of 125.4 m. Both conditions benefit most from a low initial reservoir level. This conflicts however with the other two objectives of the multipurpose dam: storage of water for irrigation and hydropower.

Therefore, pre-releases from the reservoir to create extra storage capacity for flood mitigation will only be acceptable if the rule curve levels will at least be attained again after the passage of the flood. This requires thus a reliable forecast of a guaranteed minimum inflow volume to the reservoir. The safe flood condition requires also a reliable forecast of the total inflow from the uncontrolled catchments, i.e. of the

Brahmani downstream of Rengali and of the entire Baitarani. It is noted that effective manipulation of the gates atRengali require proper information about the flow conditions well in advance. The travel time of Rengali releases to the delta is about 20 hours. This is almost equal to the basin lag (= time between centroids of net rainfall and runoff) of the Brahmani basin draining downstream of Rengali (about 24 hours) and only slightly less than the basin lag of Baitarani(approximately 30 hours). ***However, we don't seem to be having any reliable systems of inflow forecasting in place as yet. This needs to be looked into with utmost urgency now.***

The government cannot say that it was not warned of these issues earlier. The CWC document had already pointed out the following weak points of the Rengali dam project and its flood control mechanisms, as follows:

• The system produces insufficient lead time for the flow at Rengali. It does not account for the Brahmani basin upstream of Panposh, which comprises about 75% of the basin area controlled by Rengali dam. The lag time between rainfall in this area and its contribution to the Brahmani flow at Rengali is about 30 hrs for Koel and 24hrs for Sankh river.

• Contributions of the sub-basins below Panposh and in the Baitarani catchment are difficult to estimate, though rainfall is to some extent considered in the correlation technique used to produce the forecasts.

• The lead times are also small because neither rainfall-runoff modelling is considered nor are quantitative precipitation forecasts taken into account.

• The inflow to the delta, contributions by the delta area itself and the water levels at sea determine the flood stages in the delta. The present system does not provide any means to translate the boundary conditions into flood levels.

The report had also noted that effective flood mitigation through Rengali dam requires proper information about the flow conditions upstream as well as downstream of the dam well in advance. The Rengali releases travel in about 20 hrs to the delta, which is only slightly less than the basin lags of the uncontrolled areas (respectively about 24 and 30hours for Brahmani d/s of Rengali and Baitarani).

Time the government looks into all these suggestions and opens up its Flood Management policies to public of the state and come up with a Flood Management Policy for the state which is not only technically advanced (including integration of climate change scenarios) but also transparent and involves all sections of the society through proper river basin management, reservoir operations and flood plain management activities. Below, we put forth some specific suggestions:

1. The first thing we need to understand is that we have to live with floods. All the mechanisms of better flood management practices, flood control measures, flood preparedness activities and flood forecasting practices depend on a reliable data transmission and telemetry system. Time has come, Government should catch up with the scientific practices for better flood forecasting, flood control and flood mitigation measures.

2. Regular and continuous study of river morphology, hydrology and necessary changes due to climate change and other phenomenon to keep updating the flood management practices The upper as well as lower catchments should have well defined stations for recording river discharge and water levels.

3. Having interstate agreements for all interstate rivers to have a proper mechanism of flood information sharing.

4. Flood inundation area demarcation in the whole state.

5. Flood Plain zoning regulation be implemented.

Or else, the floods will continue to be man-made and devastations will increase by the floods.

Ranjan K Panda

Convenor, Water Initiatives Odisha

Water Initiatives Odisha: ***Fighting water woes, combating climate change...*** **more than two decades now!**

R-3/A-4, J. M. Colony, Budharaja
Sambalpur 768 004, Odisha, INDIA
Mobile: +919437050103
Email: ranjanpanda@gmail.com, ranjanpanda@yahoo.com

You can also mail me at: ranjan.waterman@facebook.com
Skype: ranjan.climatecrusader

Blog: http://www.climatecrusaders.blogspot.com/
Please join our group 'Save Rivers Save Civilizations' at http://www.facebook.com/groups/220598744649462
Kiss the rain when you can, because water and abundance are falling apart...(Ranjan Panda)
==========

Water Initiatives Odisha (WIO) is a state level coalition of civil society organisations, farmers, academia, media and other concerned, which has been working on water, environment and climate change issues in the state for more than two decades now.