Site Visit Report

Wular Lake, J&K

Submitted by

Alternate Hydro Energy Centre
Indian Institute of Technology Roorkee

Sept 15, 2015
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Report on the ongoing activities for conservation of Wular lake

1. Introduction

Ministry of Environment, Forests and Climate Change (MoEF&CC) assigned to Alternate Hydro Energy Centre (AHEC), Indian Institute of Technology Roorkee (IITR) to undertake a site visit by a team of experts and submit a report covering the following aspects:

(i). To study the existing action plan for conservation of Wular lake
(ii). To study the time line suggested for each activity
(iii). To visit Srinagar and discuss with Wular Conservation and Management Authority (WUCMA) the present status of implementation of the project for the conservation, protection and development of Wular Lake.
(iv). To visit Wular lake and the works undertaken and discuss with the officers implementing the project and progress achieved so far and the issues that arise during implementation.
(v). To review the efficacy of the action plan and suggest modifications, if any.
(vi). After the visit to submit the report on the status of implementation of the project in accordance with the action plan.

Accordingly, a team of experts from AHEC IIT Roorkee comprising of Dr Arun Kumar, Chair Professor (RE) and CSO, AHEC, Prof Z Ahmad, Department of Civil Engineering and Shri Umar F Khan, Environmental Planner has undertaken a site visit during Sept 11 – 13, 2015. The report has been prepared by the visiting team along with Prof DP Zutshi, Formerly with JNU.

2. Visit to Srinagar and Wular lake

The team arrived in Srinagar on Sept 11, 2015 and in the afternoon, a power point presentation on its overall plan, objectives, activities undertaken and planned was made by WUCMA in the meeting room of Forest Department. Following documents were made available to the visiting team:

(a) A copy of presentation by WUCMA
(b) Status report on Wular conservation and restoration Plan, March 2015
(c) Technical note on implementation of revised management action plan
(d) Monitoring of Wular lake and its immediate catchment area using remote sensing and GIS under Wular conservation project, June 2015
(e) Environmental Impact Study of revised management action plan for Wular lake - Draft Final Report by University of Kashmir, Srinagar

MoEF&CC has also forwarded a copy of the sanction letters of Ministry of Finance along with a copy of report of Director, MoEF&CC Regional Office, Chandigarh, Dec 2014.

The Comprehensive Management Action Plan (CMAP) for Wular lake Kashmir prepared by Wetland International South Asia, June 2007 was downloaded from the website for reference use.

The team visited Wular lake on Sept 12, 2015 and inspected some of the works undertaken by the WUCMA. Photographs taken during site visit are attached at Annexure I.

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This report has been prepared based on the documents made available to the team and discussion, site visit and also on the experience of the team gained from studies carried out on various lakes and wetlands of India including preparation of detailed project reports on conservation and management of Dal lake and Nainital lake during past two decades.

3. **Review of the existing plan of activities**

The CMAP for Wular lake, Jammu and Kashmir was prepared by the Wetlands International, South Asia, New Delhi in 2007 to the state government for its implementation. After a gap nearly four years, the state government constituted WUCMA to oversee the conservation and management of the lake, which is an internationally recognized wetland under Ramsar Convention. Although the report contains numerous recommendations and action plans in the terms of catchment improvement, restoration of water quality and conservation of biodiversity, it grossly lacks in details for execution of plans broadly in the following areas:

1. **Hydrological studies**
   (a) Water budget of the lake – Inflow, outflow, evaporation, percolation, evapotranspiration
   (b) Bathymetry and topographical surveys of the lake
   (c) Assessment of sediment yield from the catchments of Wular lake under different land uses. River Jhelum and upcoming Kishenganga hydro project.
   (d) Deposition pattern of sediment in the lake basin
   (e) Basin morphology

2. **Water quality (physical, chemical) at inflows, outflows at different sites during different months.**

3. **Assessment of quality and quantity of incoming waste water into lake from the surrounding villages.**

4. **Surveys and identification of disposal sites for dredged sediment and harvested weeds from the lake.**

5. **Impact of rapidly spreading alien invasive species specially alligator weed (Alternanthera philoxeroides) and water fern (Azolla cristata), on the lake biodiversity.**

6. To plan and implement the application of engineering and agricultural practices for maintaining the minimum required water depth and its water spread in the Haigam and Malgum, the two important associated wetlands of Wular. This may be done in consultation and cooperation with the Irrigation and Flood Control Department as well as Rakhs and Farms department.

7. **Impact of tail water flows from upcoming Kishenganga hydro project into Wular lake through Madhumati river on (a) Water budget, (b) sediment management and (c) aquatic life**

8. **Studies for installation of solar water heating systems, solar photovoltaic, Unnat Chulhas (improved version) in the lake catchment and a small hydro project in Erin watershed.**

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9. No studies were undertaken under CMPA to cross check the available secondary data and ground truthing of remote sensing data based assessment and plans.

4. Observations on the ongoing activities

1. WUCMA has completed the demarcation of the Wular lake by fixing 1159 boundary pillars around the lake in periphery of 83 km. For this WUCMA needs to be complimented as the area of the Wular lake has now been defined as 130 sq km and that is an achievement.

2. There is an immediate need to prepare a conservation plan for reclaimed area.

3. A topographical survey of 7.0 sq. km in the lake area has been carried out in the vicinity of the outlets of Naaz Nallah and one of the inflow channels of Jhelum river.

4. Out of above surveyed area, dredging upto 1.6 m depth has been carried out covering an area of about 0.7 sq. km.

5. 26,448 number of willow trees in the lake area under forest department 3,797 trees under the control of Rakhs and Farms and Agriculture departments have been felled/removed. This has generated revenue of Rs. 281.57 Laes + Rs. 11.25 Laes = Rs. 292.82 laes to the state exchequer.

6. Regarding soil conservation activity afforestation using 1,91,000 conifer plants and 1,40,000 broad leaved plants in an area of 507 ha have been undertaken. Further, small scale engineering works with 47,110 cum of Dry Rubble Stone Masonry check dams and 32,922 cum of boulders filled wire crate bunds (5065 No’s) have been undertaken. 1,21,400 No. of earthen bags were used for raising check dams across eroded gullies. These are well established practices and should be carried out in the entire catchment using the balance amount available with the Authority.

7. For further improvement of micro watersheds 71,240 plants of Apple, Pear and Walnut distributed amongst beneficiaries in 18 No of Micro watersheds covering an area of 150 ha horticulture plants, 39,000 Poplar plants covering an area of 100 ha for promotion of Agro-forestry and 3,600 Nos. vegetable seed kits have been distributed to the villagers. These practices also need to be continued covering the entire catchment with the balance amount available. However, the impacts should be regularly monitored and analyzed through an independent third party.

8. WUCMA has involved State Department of Environment and Remote Sensing and CORD, University of Kashmir to carry out remote sensing based monitoring of lake area and EIA, respectively. However such activities have a limited scope and should be used as one of the inputs for overall monitoring by the state high level monitoring committee (chaired by Chief Secretary) or MoEF&CC suggested monitoring committee (chaired by Chief Secretary / Commissioner cum Secretary). Unfortunately, such state level monitoring committees do not meet frequently, resulting in lack of effectiveness in resolving administrative, financial, procurement and institutional issues.

9. Alternate source of energy: In the era of high penetration of renewable energy such as solar energy in the country, its deployment in the catchment is not seen. For example.
solar water heater systems which are very effective way of reducing the fire wood consumption is not seen. The use of solar photovoltaic for lighting and other purposes in such remote areas is also not seen.

10. Although the project proposal has a component of sewage treatment and solid waste management for the adjoining villages and the catchments, unfortunately this has not been addressed so far.

11. From the presentation and discussions, it was learnt that a Water Master Dredger equipment for sediment excavation of Wular is being planned for procurement in the coming months. In our opinion this should be deferred for the time being and may be reviewed at later date.

5. Suggestive Activities of the project up to March 31, 2016

1. Execute the remaining double works up to March 31, 2016 (allowed by Finance Commission and the state government) in the fast track for the available balance money by the WUCMA.

2. Carryout the suggested studies and surveys to quantify the proposed works for the Conservation of lake.

3. Allow the remaining budget available with the Authority to be utilized on the following works, which fall within the overall frame work of the lake conservation and management programme:
   (i) To undertake suggested studies as mentioned at section 3
   (ii) Soil conservation and watershed management works in the lake catchment
   (iii) Water conservation works
   (a) As per the information provided during the discussion, 30 villages have been notified under WUCMA as “local area”. It is recommended that the treatment of sewage generating from the households of 21 out of 30 notified villages in the lake periphery may be undertaken on priority basis as these villages are located very close to the lake periphery. Names and population (Census 2011) of these 21 villages are given in Table 1. CMAP report suggested “construction of manmade wetlands” at village level for sewage treatment. This being a simple and inexpensive treatment technology, which requires no chemical or power and also has low maintenance cost and therefore, should be preferred and implemented. These wetlands can be easily constructed using different sizes in small plots to cater to small drain and inflow channels as per sewage quantity generated in each peripheral village. In addition to this way of treatment, decentralized community based toilets may also be constructed to stop the open defecation in each village.
   (b) Removal of willow trees from the lake basin.
   (c) Dredging of silted lake area especially near the entry points of Jhelum river and Naaz channel for which WUCMA has already carried out the topographical surveys.
   (iv) There are few stone quarries and a large number of workshops in the Erin catchment resulting in sediment inflow to the lake. A comprehensive plan is required to be prepared and executed so that residual sediment from these
quarries and workshops is arrested and periodically disposed off at identified
suitable areas.

(v) Institutional development
(a) Office expenses including rent of the building
(b) Office building at allocated land by the state government
(c) GPSs, Cameras, Binoculars and total station
(d) Hiring/procurement of boats
(e) Procurement of vehicles
(f) Training and capacity building
(g) Awareness and outreach
(h) Documentation, dissemination

(vi) Allow the revenue collection (from felling of the Willow trees, fisheries,
economic water plants, like water chestnut, eco tourism) by the Authority to
execute the works.

4. Institutional arrangement and efficacy: WUCMA presently lacks in required
infrastructure for taking up such projects of conservation and management. They
do not have man power especially in the areas of aquatic ecology, fishery, biodiversity,
hydrology, sedimentation/morphology and social science etc. They also do not have
their own setup, facilities of plan or non plan expenditure, monitoring, mechanism,
instrumentations and laboratories required for such work.

As per advisory issued by the MoEF&CC to all state, all wetlands and lakes should be
managed by the single state Authority. Thus it is imperative and efficient to merge
various authorities dealing with lakes and wetlands in the state including WUCMA
into one Authority which may be existing Jammu and Kashmir Lakes and Waterways
Development Authority (JKLWDA). This Authority has sufficient experience in
implementing works of similar nature in Dal lake, a large manpower base with
officers of different fields/expertise to take up to work for Wular lake and be further
strengthen as required.

Table 1: Villages and Towns in the immediate surroundings of Wular Lake notified under
WUCMA (Population Source – Census 2011)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>District</th>
<th>Tehsil</th>
<th>Village code</th>
<th>Village name</th>
<th>Households</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bandipora</td>
<td>Bandipora</td>
<td>2763</td>
<td>Bandipora</td>
<td>3573</td>
<td>25795</td>
</tr>
<tr>
<td>2</td>
<td>Bandipora</td>
<td>Bandipora</td>
<td>2764</td>
<td>Gund Dachhana</td>
<td>758</td>
<td>5167</td>
</tr>
<tr>
<td>3</td>
<td>Bandipora</td>
<td>Bandipora</td>
<td>2765</td>
<td>Brar</td>
<td>207</td>
<td>9167</td>
</tr>
<tr>
<td>4</td>
<td>Bandipora</td>
<td>Bandipora</td>
<td>2748</td>
<td>Ashitongu</td>
<td>174</td>
<td>1068</td>
</tr>
<tr>
<td>5</td>
<td>Bandipora</td>
<td>Bandipora</td>
<td>2750</td>
<td>Qazipora Patushi</td>
<td>601</td>
<td>4074</td>
</tr>
<tr>
<td>6</td>
<td>Bandipora</td>
<td>Bandipora</td>
<td>2749</td>
<td>Kunas</td>
<td>1114</td>
<td>7229</td>
</tr>
<tr>
<td>7</td>
<td>Bandipora</td>
<td>Bandipora</td>
<td>2744</td>
<td>Murad Pora (Mangni Pora)</td>
<td>777</td>
<td>5271</td>
</tr>
<tr>
<td>8</td>
<td>Bandipora</td>
<td>Bandipora</td>
<td>2768</td>
<td>Garoora</td>
<td>627</td>
<td>4021</td>
</tr>
<tr>
<td>9</td>
<td>Bandipora</td>
<td>Bandipora</td>
<td>2747</td>
<td>Aloosa</td>
<td>537</td>
<td>3528</td>
</tr>
<tr>
<td>10</td>
<td>Bandipora</td>
<td>Sonawari</td>
<td>2813</td>
<td>Nisbal Ghat</td>
<td>1856</td>
<td>11044</td>
</tr>
<tr>
<td>11</td>
<td>Bandipora</td>
<td>Sonawari</td>
<td>2773</td>
<td>Shah Gund</td>
<td>955</td>
<td>7044</td>
</tr>
</tbody>
</table>

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### S. No., District, Tehsil, Village code, Village name, Households, Population

<table>
<thead>
<tr>
<th>S. No.</th>
<th>District</th>
<th>Tehsil</th>
<th>Village code</th>
<th>Village name</th>
<th>Households</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Bandipora</td>
<td>Sonawari</td>
<td>2785</td>
<td>Gundí Jahanír</td>
<td>425</td>
<td>3301</td>
</tr>
<tr>
<td>13</td>
<td>Bandipora</td>
<td>Sonawari</td>
<td>2775</td>
<td>Sadhunara Hasti Khan</td>
<td>1260</td>
<td>8674</td>
</tr>
<tr>
<td>14</td>
<td>Bandipora</td>
<td>Sonawari</td>
<td>2778</td>
<td>Gundí Sader Koot</td>
<td>1047</td>
<td>7152</td>
</tr>
<tr>
<td>15</td>
<td>Baramulla</td>
<td>Sopore</td>
<td>2215</td>
<td>(Turchoo) Dará Nambal</td>
<td>291</td>
<td>2028</td>
</tr>
<tr>
<td>16</td>
<td>Baramulla</td>
<td>Sopore</td>
<td>2207</td>
<td>Janwara</td>
<td>335</td>
<td>2462</td>
</tr>
<tr>
<td>17</td>
<td>Baramulla</td>
<td>Sopore</td>
<td>2206</td>
<td>Wam Pora</td>
<td>863</td>
<td>5891</td>
</tr>
<tr>
<td>18</td>
<td>Baramulla</td>
<td>Sopore</td>
<td>2209</td>
<td>Adí Pora</td>
<td>402</td>
<td>2688</td>
</tr>
<tr>
<td>19</td>
<td>Baramulla</td>
<td>Sopore</td>
<td>2249</td>
<td>Mugarí Pora Pain</td>
<td>36</td>
<td>203</td>
</tr>
<tr>
<td>20</td>
<td>Baramulla</td>
<td>Sopore</td>
<td>2545</td>
<td>Hathiánga</td>
<td>126</td>
<td>539</td>
</tr>
<tr>
<td>21</td>
<td>Baramulla</td>
<td>Sopore</td>
<td>2189</td>
<td>Wālab</td>
<td>325</td>
<td>2164</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td><strong>16,320</strong></td>
<td><strong>1,10,967</strong></td>
</tr>
</tbody>
</table>

### 6. Time line

It is recommended that the time line for carrying out various activities for conservation and management of Wular lake may be divided into two phases:

**Phase 1:** Up to 31 March 2016: These are given in table 2.

**Phase 2:** Activities for Phase 2 are given in table 3.

Table 2: Activities with schedule for Phase 1

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Studies and surveys</td>
<td>March 31, 2016</td>
</tr>
<tr>
<td>1. Hydrological studies</td>
<td></td>
</tr>
<tr>
<td>(a) Water budget of the lake – Inflow, outflow, evaporation, percolation, evapo-transpiration</td>
<td></td>
</tr>
<tr>
<td>(b) Bathymetry and topographical surveys of the lake</td>
<td></td>
</tr>
<tr>
<td>(c) Assessment of sediment yield from the catchments of Wular Lake, River Jhelum and upcoming Kishenganga hydro project.</td>
<td></td>
</tr>
<tr>
<td>(d) Deposition pattern of sediment in the Wular lake Basin morphology</td>
<td></td>
</tr>
<tr>
<td>2. Water quality (physical, chemical) at inflows, outflows and different locations during different months</td>
<td></td>
</tr>
<tr>
<td>3. Assessment of quantity and quality of incoming waste water into lake from the surrounding villages.</td>
<td></td>
</tr>
<tr>
<td>4. Surveys and identification of disposal sites for dredged sediment and harvested weed from the lake.</td>
<td></td>
</tr>
<tr>
<td>5. Impact of rapidly spreading two alien invasive species namely Alligator weed (Alternanthera philoxeroides) and water fern (Azolla cristata), on the biodiversity.</td>
<td></td>
</tr>
<tr>
<td>6. To plan and implement the application of engineering and agricultural practices for maintaining the minimum required water depth and spread in the Haigam and Malgam, the two important associated wetlands in consultation and</td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Schedule</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>cooperation with Irrigation and Flood Control Department as well as Rakhis and Farms department.</td>
<td></td>
</tr>
<tr>
<td>7. Impact of tail water flows from upcoming Kishenganga hydro project into Wular lake through Madhumati river on (a) Water budget, (b) sediment management and (c) aquatic life</td>
<td></td>
</tr>
<tr>
<td>8. Studies for installation of solar water heating systems, solar photovoltaic, Unnat Chulhas, small hydro project in Erin watershed.</td>
<td></td>
</tr>
<tr>
<td>(ii) Soil conservation works</td>
<td></td>
</tr>
<tr>
<td>(iii) Comprehensive plan for trapping and disposing the residual sediment emanating from stone quarries and workshops in Erin catchment.</td>
<td></td>
</tr>
<tr>
<td>(iv) Treatment of sewage generated from 21 villages in the periphery under WUCMA using constructed wetland. List of villages and details of population is attached.</td>
<td></td>
</tr>
<tr>
<td>(v) Removal of willow trees</td>
<td></td>
</tr>
<tr>
<td>(vi) Dredging of silted lake bed near the areas of entry Jhelum river and Naz channel</td>
<td></td>
</tr>
<tr>
<td>(vii) Institutional development</td>
<td></td>
</tr>
<tr>
<td>(a) Office expenses including rent</td>
<td></td>
</tr>
<tr>
<td>(b) Office building</td>
<td></td>
</tr>
<tr>
<td>(c) GPS, Camera, Binoculars, total station</td>
<td></td>
</tr>
<tr>
<td>(d) Hiring/procurement of boats</td>
<td></td>
</tr>
<tr>
<td>(e) Hiring of vehicles</td>
<td></td>
</tr>
<tr>
<td>(f) Training and capacity building</td>
<td></td>
</tr>
<tr>
<td>(g) Awareness and outreach</td>
<td></td>
</tr>
<tr>
<td>(h) Documentation, dissemination</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Activities with schedule for Phase 2

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Activities</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Strengthening of the existing Authority and/or merging it with JKLWDA</td>
<td>June 30, 2016</td>
</tr>
<tr>
<td>2.</td>
<td>Constitution of scientific advisory committee for the lake</td>
<td>June 30, 2016</td>
</tr>
<tr>
<td></td>
<td>(a) Sediment management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(b) Water conservation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(c) Fish and fisheries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(d) Avifauna conservation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(e) Economically important water plants</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(f) Waste management from the periphery</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(g) Solar water heating systems, solar photovoltaic, Unnat Chulhas</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(h) Small hydro project in Erin watershed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(i) Ecotourism</td>
<td></td>
</tr>
<tr>
<td>Sl. No.</td>
<td>Activities</td>
<td>Schedule</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>4.</td>
<td>Willow trees felling/removal</td>
<td>March 31, 2018</td>
</tr>
<tr>
<td>5.</td>
<td>Execution of activities&lt;br&gt;(a) Sediment management&lt;br&gt;(b) Water conservation&lt;br&gt;(c) Fish and fisheries&lt;br&gt;(d) Avifauna conservation&lt;br&gt;(e) Economically important water plants&lt;br&gt;(f) Waste management from the periphery&lt;br&gt;(m) Solar water heating systems, solar photovoltaic, Unnat (improved version) Chullas&lt;br&gt;(g) Small hydro project in Erin watershed&lt;br&gt;(h) Ecotourism&lt;br&gt;(i) Control and management of invasive weeds&lt;br&gt;(j) Monitoring of conservation and management plan&lt;br&gt;(k) Public awareness and participation</td>
<td>March 31, 2020</td>
</tr>
</tbody>
</table>

### 7. Financial Progress and Implications

Based on the details received from WUCMA, financial implications with planned and suggested activities are given in Table 4.

#### Table 4: Financial Implications with activities for Phase 1

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Scheme</th>
<th>Amount sanctioned by 13th Finance commission in 2011</th>
<th>Total Amount Sanctioned &amp; released As I &amp; II Installments</th>
<th>Total Funds Utilized Ending 03/2015</th>
<th>Recommended amount for Remaining Funds</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Survey and Demarcation</td>
<td>225</td>
<td>225.00</td>
<td>113.70</td>
<td>111.3</td>
<td>Such study is required for carrying out phase 2 activities.</td>
</tr>
<tr>
<td>2.</td>
<td>Catchment Conservation (a)</td>
<td>2400</td>
<td>1380.00</td>
<td>1107.34</td>
<td>272.66</td>
<td>For soil conservation and watershed management</td>
</tr>
<tr>
<td></td>
<td>Afforestation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Added regeneration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Small scale engineering measures Check dams (c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management of High Altitude (d)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management of Horticulture &amp; Dry Land (e)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

AHEC IIITR/Site Visit/Wular Lake/Sept 2015
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Scheme</th>
<th>Amount sanctioned by 13th Finance commission in 2011</th>
<th>Total Amount Sanctioned &amp; released As I &amp; II Installments</th>
<th>Total Funds Utilized Ending 03/2015</th>
<th>Recommended amount for Remaining Funds</th>
<th>Remarks</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Agriculture</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>(f)</td>
<td>Alternate Source of Energy</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3.</td>
<td>Water Management</td>
<td>9180</td>
<td>4290.00</td>
<td>1878.53</td>
<td>2411.47</td>
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</tr>
<tr>
<td>(a)</td>
<td>Enhancement of water Holding Capacity</td>
<td></td>
<td></td>
<td></td>
<td>1727.37</td>
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</tr>
<tr>
<td>(i)</td>
<td>Selective Dredging of Silted Areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii)</td>
<td>Removal of willow plantations</td>
<td></td>
<td></td>
<td>0.00</td>
<td>No expenditure required.</td>
<td></td>
</tr>
<tr>
<td>(iii)</td>
<td>Equipment Augmentation</td>
<td></td>
<td></td>
<td>0.00</td>
<td>May be deferred.</td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>Rejuvenation of Associated Wetlands</td>
<td></td>
<td></td>
<td>200.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>Sevage Management in Peripheral villages</td>
<td></td>
<td></td>
<td>300.00</td>
<td>Recommended to be executed.</td>
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</tr>
<tr>
<td>(d)</td>
<td>Allocation of water for human &amp; Ecology Purpose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(f)</td>
<td>Studies for specific for water budgeting</td>
<td></td>
<td></td>
<td>100.00</td>
<td>Such study is required for planning the details of activities</td>
<td></td>
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<tr>
<td>4.</td>
<td>Institutional Development</td>
<td>195</td>
<td>105.00</td>
<td>65.90</td>
<td>150.00</td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>Establishment of Wular Development, Office expenses including rent, Office building, GPS, Camera, Binoculars, total station, Hiring of boats, procurement of vehicles, Training, Awareness and outreach and Documentation,</td>
<td></td>
<td></td>
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</tbody>
</table>

AHEC IIITR/Site Visit/Wular Lake/Sept 2015

9
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<th>Recommended amount for Remaining Funds</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b)</td>
<td>dissemination</td>
<td>12000.00</td>
<td>6000.00</td>
<td>3165.47</td>
<td>3165.47</td>
<td></td>
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<tr>
<td>(c)</td>
<td>Capacity Building</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d)</td>
<td>Communication &amp; Extension</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d)</td>
<td>Monitoring &amp; Evaluation</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Grand Total:-</td>
<td></td>
<td>12000.00</td>
<td>6000.00</td>
<td>3165.47</td>
<td>3165.47</td>
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</table>

The success of conservation and management plan of lake also depends on the financial viability and timely inflow of funds. Incidentally Wular lake has a distinct advantage of generating adequate funds from the sale of willow plantation present in the lake basin. The removal of willow plantation from the lake body has already been indicated as the top priority. Based on the funds generated from tree felling of about 28,000 plants (Rs. 2.92 crores) achieved so far by the Authority, on a conservative estimates, from 21.84 lacs of plants in the lake, a sum of Rs. 228 crores would be available. However such utilization of this revenue by WUCMA requires the specific approval of the state government.

For Phase 1, the utilization of balance amount available from the finance commission for the suggested studies and activities will form the basis for carrying out the Phase 2 activities.

For Phase 2 activities, the revenue generated from Willow felling is utilized.

8. Conclusion and Recommendations

It is the impression of visiting team that if immediate and timely measures to protect the water body are not taken, there would be further reduction in its water holding capacity of the Wular lake due to siltation; weeds growth, willow plantation and catchment degradation etc., resulting in livelihood loss to lacs of people living around the lake and flooding of upstream towns and villages in the river Jhelum catchment and the loss of biodiversity.

In view of the above, the following are recommended for the conservation of the Wular lake:

1. Execute the doable remaining works upto March 31, 2016 from the funds available by finance commission and state government in the fast track.

2. Allow the remaining budget available with the Authority to be utilized on the following works which fall within the overall frame work of the lake conservation and management programme even though some of these activities are not well defined in the CMAP document and WUCMA proposed action plan:

To carry out studies on hydrological aspects including water budget, bathymetry and topographical surveys of the lake, assessment of sediment erosion from catchment of Wular Lake, river Jhelum and upcoming Kishenganga hydro power project, rate of sediment deposition in the Wular lake at different sites and basin morphology, water quality (physical, chemical) at different locations in different months, surveys and

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identification of disposal sites for dredged sediment and weed harvested from the lake, alligator weed (*Alternanthera philoxeroides*) and water fern (*Azolla cristata*) and their impact on the biodiversity, minimum required water depth and spread in the Haigam and Malgam, the two important associated wetlands, impact of tail water flows from upcoming Kishenganga hydro power project into Wular lake through Madhumati river on (a) Water budget, (b) sediment management and (c) aquatic life.

3. To treat sewage generated from 21 notified villages which are located in the immediate lake periphery by using "manmade wetlands" sewage treatment technology close to the drain area on priority basis. In addition to sewage treatment, decentralized community based toilets may also be constructed to stop the open defecation in the surrounding areas.

4. To remove willow trees from the lake basin in phases and allow the revenue (estimated on conservative side as Rs. 228 crore), thus generated from the sale of estimated 21.84 lacs willow trees, for conservation activities of Wular lake.

5. To strengthen the existing institutional arrangements in order to carry out the project activities effectively and timely.

6. To create awareness meetings and workshops among the villagers and different stakeholders frequently and regularly.

7. To merge various authorities, dealing with lakes and wetlands in the state including WUCMA into one state Authority which may be the existing JKLWDA.

8. To have effective monitoring by the state high level monitoring committee (chaired by Chief Secretary) as well as MoEF&CC suggested monitoring committee (chaired by Chief Secretary / Commissioner cum Secretary, meetings may be organized frequently for resolving various issues related to execution.

9. To Constitue a Scientific Advisory Committee (SAC) for the lake

10. On completion of suggested studies under phase 1 and thereafter preparation of the detailed activity plans, to carryout phase 2 activities using the revenue generated out of sale of willow trees.

11. In view of the limited availability of the funds at this stage and avoiding future liabilities, the procurement of a water master dredger be deferred.

12. To deploy and popularize the use of solar water heaters, solar photovoltaic, Ummat (improved version) Chulhas by providing incentives to the local population living in the lake catchment and also along the lake periphery. Also to install a run of river small hydro project in Erin watershed for using the discharge and steep available gradients.
<table>
<thead>
<tr>
<th>Photographs taken during site visit</th>
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<tbody>
<tr>
<td>Stone queries in the Erin Catchment</td>
</tr>
<tr>
<td>Nallah merging in lake</td>
</tr>
<tr>
<td>View of Wular lake in North</td>
</tr>
<tr>
<td>Jumati River merging to lake</td>
</tr>
<tr>
<td>Wular lake boundary pillar near Watlab village</td>
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</tbody>
</table>