

**Final Report on Assessment of
Command Area Development
(CAD) Plans of
Omkareshwar and
Indira Sagar Irrigation Projects
in Madhya Pradesh**

December 2010

**Expert Committee Constituted by the
Ministry of Environment and Forests
Government of India**

Constitution of the Committee

- | | |
|---|-------------------------|
| 1. Dr Devendra Pandey | Chair person |
| 2. Dr B. P. Das | Member |
| 3. Dr A. K. Bhattacharya | Member |
| 4. Dr Shekhar Singh | Member |
| 5. Dr C.K. Varshney | Member |
| 6. Dr Pawan Kumar | Member |
| 7. Dr. Nandini Sharma, | CO-opted Member |
| 8. Shri. N. V. Venkataraman | CO-opted Member |
| 9. Dr. Suresh Patil | CO-opted Member |
| 10. Shri A K Rana
Regional CCF(Bhopal) | Member Secretary |

Final Report on assessment of Command Area Development (CAD) Plans of Omkareshwar and Indira Sagar Irrigation Projects in Madhya Pradesh

A. CAD Plan of Omkareshwar Project

a1. Introduction

The Omkareshwar multipurpose project comprises a non-overflow dam, a power dam, a power house of 520 MW installed capacity, left and right bank flow canals and a right bank lift canal. Over about last one year, the Committee has been receiving the project related documents and listening to the presentation, besides visiting the site a limited number of times. The data on certain project details were found varying in the documents and received from time to time. According to the latest information as on 31-10-2010, made available through presentation as well as through documents, the gross command area of the project is 2,14,200 ha and the culturable command area is 1,46,800 ha. The planned annual irrigation intensity, which is arrived at by considering the lands that are irrigated more than once in a year, is 193 per cent. It is the culturable command area of 1,46,800 ha for which the command area development plan is relevant. A map of the command area with legends is shown in Fig. 1.

The Omkareshwar Water Resource Project is planned and being developed as multipurpose project with provision for irrigation and power. An integrated and multi-disciplinary approach has been adopted for planning, formulation, clearance and implementation of projects, including catchment area treatment and management, environmental and ecological aspects, the rehabilitation of affected people and command area development. Ministry of Water Resources (GoI) has formulated detailed guidelines for development of command area through management of water in its quality and quantity, which are to be followed for making irrigation sustainable with minimum possible degradation of the environment of the land, which is planned to be irrigated.

a2. Command Area Development

Command Area Development (CAD), is a sub-component of the Water Delivery & Drainage System (WDDS) with greater emphasis on infrastructure and operations at the local level. It involves activities the structural and operational components of which are important for environmental aspects (sustainability) of the project. These activities could be summarized in following heads:

- Construction of water courses and field channels,
- Land leveling and shaping,
- Provision of field drainage,
- Assistance to farmers in the development of groundwater and conjunctive use schemes,
- Provision of roads,
- Development of marketing and warehousing facilities,
- Establishing agriculture demonstration farms,
- Strengthening cooperative structures
- Arrangement of farm inputs, and
- Consolidation of land holdings where necessary.

Examination of the earlier project documents revealed that the CAD plan for the command area under the Omkareshwar project would be identical to that prepared for the Indira Sagar project due to perceived similarity in the features of command areas of both the projects and also these two command areas are contiguous. Subsequently, NVDA found with reference to the orientation of the Narmada River the commands of the two projects in view of slope and soil characteristics are different. The command of Omkareshwar is nearer to the Narmada River and this would require the CAD plan for the Omkareshwar project to be planned on the basis of different base line data than those for the Indira Sagar project.

The committee submitted an ***Appraisal Report, in April 2010 to the MoEF based on the documents made available to the Committee till March 2010 (Annexure I). Current report is based on the examination of the CAD plan documents subsequently submitted by NVDA for the command area of Omkareshwar project till October 2010. NVDA also provided some documents and clarifications to the committee during its field visits and meeting at Indore between October 28 to October 31, 2010. Annexure II gives the list of all the earlier submitted and the newly submitted documents perused for the preparation of this report.***

a3. Methodology Adopted for the Assessment of the Command Area Development Plan of Omkareshwar Project

The Committee, besides being provided with various plan and presentation documents, has also been provided with a clear map showing the relative positions of

the dams of Indira Sagar, Omkareshwar, Maheshwar, Man and Jorbat in sequence and also the respective command areas, the main and branch canals, the respective command areas, both under flow irrigation scheme and under lift irrigation scheme. The works to be taken up in the command areas in different phases are also identified on the map. The relevant documents prepared at different times and provided to the Committee for scrutiny were found to have some variation in the technical data on the actual area to be irrigated. According to the latest document submitted to the Committee in October 2010 before the field visit, the Omkareshwar command has a lift irrigation components of 54,630 ha through the right bank lift canal; flow irrigation through left bank canal to irrigate 20,580 ha and right bank flow canal to irrigate 70,630 ha, out of the total irrigated command area of 146,800 ha. The total work of canal construction has been divided in four phases corresponding to different extent of proposed irrigated area in each phase as follows: Phase I (flow canal) – 24,000 ha; Phase II (flow canal) – 19,578 ha; Phase III (flow canal) – 48,592 ha and Phase IV (lift canal) – 54,630 ha. In addition to scrutinizing the various documents related to the project, as were made available to the Committee, it also undertook a field visit during 29 & 30 October, 2010 to assess the ground realities of the progress of various works.

a4. Findings of the Committee

During the field visit on 29th October 2010, the Committee observed that 75 per cent of the works in Phase I (24,000 ha) of the command has been completed and 20 per cent of the works in Phase II and Phase III under the Right Bank Canal are also completed. Tendering process of the works under Phase IV lift irrigation system is under progress.

At some places the local cultivators mentioned that there was overlapping of the proposed Omkareshwar lift canal command area with the irrigation that already exists through the tanks, wells and direct lift from the Narmada River. Many farmers are lifting water through pumps directly from river and taking water upto several km for irrigating their farms. They had the perception that irrigation through the lift canal might not serve any additional purpose. The visiting committing team considered this point and sought clarification from the project authorities. The project authorities, referring to their records of existing and planned irrigation, clarified that though the irrigation potential under the existing irrigation facilities from the sources mentioned above were 13,746 ha out of the total of 1,46,800 ha, but the area actually receiving irrigation water from the existing sources was only 6173 ha. This is a quite a small area the necessity of creation of the lift irrigation command under the Omkareshwar project appears justified. Moreover, tank

water based irrigation is uncertain due to its limited availability in certain months of the year and the cost of groundwater pumping is not affordable by the generally resource-poor cultivators, as the present groundwater table is deep, requiring construction of deeper wells and the corresponding requirement of more expensive heavy duty pumping system. The project documents have highlighted that the direct river lift, groundwater pumping, etc., are being adopted by relatively better off cultivators and the financially less solvent cultivators are generally not the beneficiaries of such endeavours. The Committee also felt upon field visit that against the claim of some cultivators' for irrigating a strip 10 km wide by direct lift from Narmada River on its both sides, only about a 3 to 4 km strip is possible using 15 hp pump sets. A small overlap in the command area due to irrigation from existing sources and the water resources created under the Omkareshwar project does not negate the necessity of the Omkareshwar project. The Committee, however desired that the project authorities (NVDA) should map such existing irrigation sources in the command area and delineate them along with their potential and actual irrigation done as well as their water distribution network so that when the lift irrigation component of the project becomes operative, it can be integrated with the command area currently being irrigated using the available water resources (i.e., river lift, tanks and wells). This will ensure a better water use efficiency and will increase the area irrigated using water from the existing pre-project water sources as mentioned above.

The Command Area Development Plan has addressed many of the issues mentioned earlier. Of these, the Committee's main interest was to examine if the On-Farm-Development (OFD) details have been planned adequately. Planning and completion of the OFD works are essential to the sustainability of irrigation. Technically speaking, sequence-wise and importance-wise, the planning of water courses and field channels, Land leveling and shaping, field drainage and cooperative structures are the most important of all the OFD works. Consolidation of land holdings is also important but this has a tremendous social ramification. Very few command areas in India had undertaken this activity (Example: Chambal Command Area, Rajasthan). In the case of Omkareshwar project command area, since rain-fed agriculture has been in practice and some irrigation from the existing water sources is also prevalent, land consolidation is considered very difficult.

The Committee upon perusing over the plan documents and subsequent interaction with the project authority felt satisfied because among the required OFD works, the most crucial ones namely, the field channels, field drains and cooperatives in the form of Water Users' Associations (WUAs) have been planned well. In respect of

micro-planning, which is necessary for implementation of the plan in the field, it was observed that such micro-plans have been prepared for an area of 49,753 ha and the estimate of Rs. 48.55 crores has been submitted to the Zila Parishad.

Micro-planning over a sample area of 1457.7 ha (Semrala Dy. 274.5 ha; DM 66 of RBC 260.8 ha; DM 34 of RBC 150.6 ha; Chimney Dy of RBC 274.5 ha and DM 3 of LBC flow canal 497.3 ha), comprising lined water courses with built in outlets, field channels and field drains, were shown to the Committee during the field visit.

On land shaping and grading, presently no activity is planned or accomplished. In view of the fact that lands with slope steeper than 1 per cent (a good slope for flow irrigation is considered 0.5 per cent) would require soil movement to varying extent once irrigation water is made available from the canal system, it is essential to include such activity in the project along with its cost. The latest project document does indicate the project authority's intention to undertake land shaping in 25 per cent of the command area, its targeted plan of accomplishment or the corresponding budget details were not found in the plan documents.

On cooperatives, until the end of the October 2010, a total of 52 WUAs have been constituted covering 49,753 ha of the planned command area falling under Phases I, II and III. However, on interaction with some of the WAUs by the committee members in field it was found that WUAs are unaware about their roles and responsibilities. It is therefore most important that WUAs are properly educated and trained by the project authorities. The task of rotational water distribution has been left to be done by the WUAs under the supervision of the command area development authority. This will require careful monitoring to avoid inequitable distribution of irrigation water among the beneficiaries due to unauthorized water use and its success will depend on the motivation and water management training level of the members of the WUAs.

Conjunctive water use in the command area has been planned on the basis of 30 per cent use of groundwater and 70 per cent water use from the canal system to meet the 100 per cent of crop water requirement. While appreciating this plan, during the meeting with the project authorities on 31st October at Indore the Committee expressed that the success of this approach will depend on three factors namely, availability of adequate numbers of groundwater structures, energy availability for groundwater pumping and restricting the canal water release to the stipulated 70 per cent of the crop water requirement. The project authority informed the Committee that the present deep

groundwater table would rise after commencement of irrigation. Even the shallow wells would suffice to supply the required water and the cultivators would be able to construct them due to their low cost. Energy availability is ensured from the project itself, as it has a hydropower component to generate 520 MW of power and surface water release would be a function of groundwater table situation with more release when groundwater table is deep and less release when groundwater table has risen to a pre-determined level.

The information about other components of command area development activities which include Provision of roads, Development of marketing and warehousing facilities, Establishing agriculture demonstration farms, Arrangement of farm inputs, and Consolidation of land holdings where necessary was not available. Of these, the feasibility of the last activity on land consolidation is already discounted. However, as the information on OFD, WUA, conjunctive water use, etc have been updated and presented to the Committee; the same has not been done with the other components of CAD activities.

a5. Conclusions

1. In view of the fact that the project authority is aware of the guidelines of command area development activities, as framed by the Ministry of Water Resources, Gol, these activities are to be prioritized for implementation. While doing so, the attention is first to be given to the soil-water-crop environment of the command area, which will receive irrigation for the first time. Sustainability of this environment depends on timely water supply to the crop land and evacuation of excess water there from. These would require attention to the OFD works in terms of timely execution of water courses, field channels and field drains in a coordinated manner and overseeing the land preparation by the members of the WUAs such that irrigation water distribution in the field becomes efficient. These have to be pari pasu with the commencement of irrigation and hence, may be planned according to the implementation schedule of the irrigation distribution network.
2. The OFD plans already prepared for a part of the command area and the sample execution sites have been examined by the Committee and have been found satisfactory. Such plans are to be completed for the remaining part of the command area and executed pari pasu with the commencement of irrigation.

3. From the commencement and during the initial years of irrigation, demonstration farms and farmers' training on efficient water management are to be in place in the command area.
4. Planning of conjunctive water use for irrigation (70 per cent canal water and 30 per cent groundwater) is good. But formulating the plan, by itself is not the necessary and sufficient condition for translating the plan to the field. Since, the construction of wells for groundwater pumping will be the responsibility of the farmers, there has to be a mechanism to motivate them to construct wells to meet the planned deficit supply of canal water. They have to be provided with the required technical guidance on scientific well location, assessing the well yield and selecting appropriate pump-prime mover combination for efficient groundwater lifting. It is of great importance that energy availability to the farmers for groundwater lifting is ensured to successfully implement the plan for conjunctive water use.
5. Of the other stipulated CAD activities, over and above the OFD items namely, roads, marketing and warehousing, demonstration farms, cooperatives, farm inputs and land consolidation; the last item has been considered infeasible. The necessity of demonstration farms has already been mentioned at Item 3 above. Due attention has already been paid to the cooperatives (WUAs) and the effort in this regard is to be strengthened. Proper attention, therefore, has to be given to the remaining activities so that the full benefit of irrigation is accrued to the farmers.
6. For the purpose of monitoring the performance of irrigation in the command area, proper record of the distributary-wise irrigation water release and the actual area irrigated by the released water is to be kept for the irrigation seasons in a year under each rotation for five years or till the system stabilizes (whichever is later). Such information is to be analyzed to measure the performance of the irrigation system. These are to be supplemented by recording and analyzing pre- and post monsoon water table in the representative locations in the command area and soil and groundwater quality parameters in the irrigated lands.

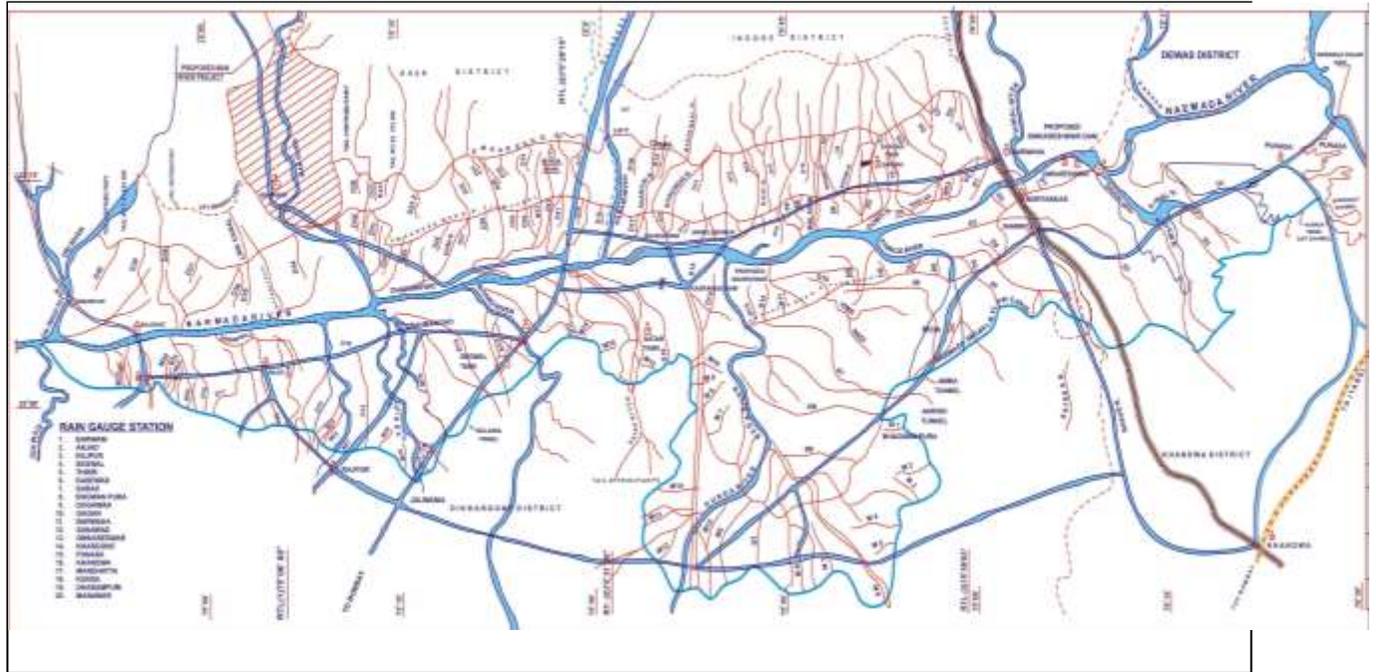


Fig. 1. Omkareshwar project Right Bank canal command area

B. CAD Plan Indira Sagar Project

b1. Introduction

According to the preliminary note on status of CAD for the ISP in Madhya Pradesh submitted by Narmada Valley Development Authority (NVDA) of March 1989 to NCA, the total CCA proposed was 1.23 lakh ha (some areas to be irrigated twice making potential area of irrigation to be 1.69 lakh ha). It was to be irrigated in three phases. The planning and implementation required preparation of detailed estimates based on field work, acquisition of land and construction of canal/ branch canals and distributaries. The preparation of plan also required incorporating an EAP(? please expand) to address issues such as health impacts, loss of bio-diversity, pollution, impact on aqua culture, related to bringing irrigation in the area.

The Environmental Impact Assessment exercise and the Environmental Management Plan documents (August 2009) of the project, made available to the Committee by the end of January 2010 were examined. It was found that several adverse impacts on the command area due to the introduction of irrigation in the command area such as water-logging, groundwater table rise, possibility of development of saline and alkali condition, seepage from the unlined irrigation conveyance network, contamination of natural streams due to mixing of agro-chemical laden surface runoff, occurrence of vector borne diseases in a wet environment and consequent health risks there from, etc., were identified. On water-logging, surface drainage was identified as a necessity over the entire ISP command area. The corresponding proposed management plans (Action Plans), however, were mere listing of standard and theoretically known methods of mitigation. The document did not spell out the activity details, the corresponding budgetary details and time frame of completion of various activities that could be measured as deliverables. According to the condition of project clearance, all these plans were required to be implemented pari-pasu with irrigation in the area.

The situations, as described in the preceding paragraph and as applicable till January 2010, were brought to the notice of the MoEF through the "Second Interim Report" of the Committee, submitted to the MoEF in February 2010 and to the project authority during their presentations to the Committee thereafter. Some subsequent documents, field visit during October 29-30 2010 and a final presentation by the PA on 31st October 2010 at Indore and subsequent discussion revealed that appropriate action

towards the above mentioned inadequacy on the plan document have been initiated and some progress has been made.

b2. Observations during field visit

During the meeting at Indore on 31st October 2010, the project authority (NVDA) had submitted a documents of Indira Sagar CAD plan showing that irrigation construction was divided in four phases. Phase I would be for 0-71 km reach with proposed irrigation to 36,100 ha; Phase II for 71-142 km reach with proposed irrigation to 26,100 ha; Phase III for 142-206 km with proposed irrigation to 20,700 ha and Phase IV under lift irrigation for 206-248 km with proposed irrigation to 40,100 ha. The respective target dates of completion are December 2011, June 2012, June 2013 and June 2015. The total number of villages to be benefited due to irrigation is 574. The target of cumulative irrigation potential to be created till 2010-11 is 51,528 ha of which 34,010 ha have been created till 2009-10 and of this, the actual irrigation has been over 16,848 ha.

The committee, during the field visit on 30th October 2010 was also shown the field channels / field drains constructed over the sample areas in all the three distributaries namely, Neelkantha, Gudariya and Roopkheda. Considering that 16,500 ha is already irrigated, and the authorities plan to extend irrigation to 51,528 ha in the FY 2010-11, they were advised to complete the micro-planning expeditiously for the entire area in the next two years. Several WUAs though formed, need to be more actively involved.

As such, detailed OFD plans in about one-third of the CCA have been prepared. Of this, the plan has been implemented over about 1 per cent sample area. These plans have been scrutinized by the Committee and were found comprehensive. Financial sanction for the OFD work in 41,240 ha CCA has been accorded. OFD works have been taken up in 1,251 ha area out of 41,240 ha CCA. The left out area has been planned to be taken up for OFD from November 2010. Micro Planning for OFD works for rest of the CCA i.e. 81,760 ha is planned to be completed by the end of March 2011. The committee had earlier visited the Command area of ISP in the initial reach and had observed that areas adjoining the main canal and distributaries were being irrigated and there were complaints regarding water logging in the field due to seepage. Plantations along the canals were also not found in place. A plan to address these issues has reportedly been submitted to the MoEF during the last week of October 2009. This plan is not yet examined & approved by the NCA Sub-Committee on CAD or by the MoEF. It

has also been reported recently (Material received through e mail on 31-10-2010 from the PA) that to address the irrigation water related issues in the command area, 18 numbers of WUAs have been constituted (variedly written as '25 WUAs constituted' in the presentation document mentioned earlier). Besides, there is a plan to use groundwater for irrigation. For lifting groundwater, power availability is stated to have been ensured from the hydropower generated in the project.

b3. Conclusions

1. After the submission of the first assessment report by the committee during April 2010 on the Command area development plans of Indira Sagar project some progress have been made by the project authority. The project authority submitted micro-plan of more areas of the command area. Further, documents were received by the end of October 2010 and during the field visit of the committee (Annexure II). The Committee feels that initiation towards fulfilling the environmental safeguard measures has been made by the project authority.
2. The Committee during the field visit was satisfied with the implementation of OFD works in the sample area of about 1 per cent of the proposed command area in accordance to the corresponding plans in the command of three distributaries. However, such implementations should progress fast over the remaining part of the command area.
3. Simultaneously, the Committee is also of the view that the remaining area for which the plans are yet to be made should also be taken up urgently and the plans may be implemented pari-pasu before releasing water for irrigation. This observation is particularly important in view of the fact that committee evidences of water-logging due to seepage when irrigation had started in the pre-plan period. Since, the CAD plans over sample areas developed by the project authority were found comprehensive by the Committee, it is suggested that similar plans for the remaining area be prepared on priority and gradually implemented.
4. For judicious irrigation water management in the field, the Water Users' Associations will play an important role. While a good number of such associations have been formed, the Committee was not quite clear if they have started functioning effectively. The CAD has a catalytic role to play in this regard by finding the water management related functions that these WUAs are doing

and guiding them so that they perform efficiently and promptly. The financial solvency of the WUAs also needs to be examined by the CAD authority, which may try to assist them if they have financial problem to start their stipulated function initially.

5. While the plan of conjunctive use of surface and groundwater was sound and environment-friendly, the progress in the groundwater use, the situation on energy availability to lift groundwater, the progress in the number of groundwater tapping structures all are to be monitored by the CAD authority to ensure that the command area does not become fully dependent upon canal water only.
6. While the Committee feels that the essential and immediate activities towards ensuring efficient irrigation water use in the command area has been started, it also feels that several other activities towards environmental safeguard were not yet in place. These are seepage control in parts of the main canal, canal bank plantation, chances of contamination of surface water due to agro-chemical use and health management loss of biodiversity as well as spread of invasive species, pollution, impact on aqua culture under a wet irrigated environment.

Annexure I

Appraisal of the Command Area Development (CAD) Plans of Omkareshwar and Indira Sagar Irrigation Projects in Madhya Pradesh

A. GENERIC ISSUES OF THE CAD

(i) Command Area

A command area is the area that receives irrigation water through a canal network from various sources, such as reservoir behind a dam, a diversion barrage, a river lift, groundwater, etc. The command area may start anywhere from the off take point of the main canal from water source. The introduction of irrigation in a command area results in changes in land, water, and the biological and socio-economic environment. These changes can be positive as well as negative. The impacts could be increased availability of water for crop production, human consumption, ground water recharge, significant and often irreversible changes in flora and fauna (both composition and distribution of species), microclimate, physico-chemical properties of the soil, surface and ground water and soil micro-organism.

Indirectly, these changes affect the socio-economic activities of the region (changes in cropping patterns, industrialization, urbanization, improved water availability), each of which also have a consequential environmental impact (increased runoff and leaching of chemical pesticides and fertilizers, industrial effluents, urban effluents, water logging and the resulting salinity due to inappropriate cropping patterns, improved health due to better sanitation, etc.)

The cumulative impacts of these changes have a significant long term impact on the ecosystem. Changes in flora can lead to changes in the dependent or interactive species of fauna, and vice versa. There can be a significant increase of invasive species (like water hyacinth) and changes in water regimes and micro climates can lead to breeding of disease vectors and changes in disease pattern.

In short, the introduction or diversion of water in a region has a host of environmental impacts that go far beyond the traditional understanding of command area development and need to be examined by institutions (like the MoEF) and that have the requisite expertise in environmental matters. Unfortunately, despite this being recognized at the highest levels of the government for over twenty years, and reiterated

in the letter of the Secretary (E&F) to the Secretary (WR) of 4th February, 1988, and by the Environmental Sub-Group of the NCA from time to time, there is still a tendency among project authorities to restrict the focus of command area development plans to the traditional concerns regarding the distribution and optimal use of irrigation water.

(ii) Command Area Development and Water Management

The Centrally Sponsored Command Area Development (CAD) Programme started in 1974-75. It envisaged execution of on-farm development (OFD) works like field channels, land levelling, field drains and conjunctive use of ground and surface water; the introduction of the rotational system of water distribution to ensure equitable and timely supply of water to each holding; and evolving and propagating crop patterns and water management practices appropriate to each command area. The main emphasis of this programme has been to give attention to the resource (land, water and other inputs to agriculture) management. For obtaining maximum benefits from irrigation water, it is essential that the command area is fully ready to receive and beneficially use' supplies. The biggest single malady in the major and medium irrigation sector all along has been the continued tendency to start more and more new projects resulting in wanton proliferation of projects, thin spreading of resource and consequent time and cost overruns. Though all the Plans, without exception, declared their intention to give priority to complete the ongoing schemes, the addition of new schemes continued unabated. It has become imperative to tighten the standards of project preparation and design before its appraisal stage. In particular, cropping patterns must be planned with due regard to soil and drainage conditions; the potential for conjunctive use of groundwater should be fully exploited and farmers educated to prepare their lands for proper irrigation.¹

(iii) Environmental Aspect

Concern over the environmental impact of an irrigation and hydro power projects arises due to failure to check erosion in catchment areas; submergence of economically and ecologically valuable forests, **irreversible damage to the biotic environment**, large-scale displacement of people, **impact on human health, pollution of river water**, over-exploitation of groundwater and damage to **soils of the cultivated land and local groundwater** due to indiscriminate use of irrigation water **that is used inefficiently under the most prevalent flow irrigation methods**². It is necessary to make sure that the crop and water use patterns are planned with due care and after

¹ Based on <http://planningcommission.nic.in/plans/planrel/fiveyr/8th/vol2/8v2ch3.htm>

² Based on <http://www.education.nic.in/cd50years/15/8p/85/8p850b03.htm>

proper investigation **so that most of the above mentioned adverse impacts could be minimized**. The command area development plan should also make sure that the project design entails disturbance of existing population settlements and forest cover to the minimum possible level within the available alternatives. The Standing Committee on Agriculture of the 11th Lok Sabha while discussing demands of Grants for the Ministry of Water Resources in the year 1996-97 has averred in its Fourth Report that "Agricultural land drainage for controlling the salinity and water logging must form the integral part of the CAD. Irrigation and drainage has to go simultaneously to sustain the productivity of the land³." Also, the Standing Committee in its Twelfth Report had averred that "The Committee expresses its serious concern over the increase in waterlogged and saline areas in the irrigation commands. On one side we are increasing the area under irrigation and at the same time we are losing part of the irrigated areas due to salinity and water logging. The Committee was shocked to know that such area has increased to 5.76 million hectares⁴."

B. COMMAND AREA DEVELOPMENT PLAN- SPECIFIC DETAILS

For any envisaged action, such as the development of a command area, a proper plan must precede the action. The action of command area development must also be *pari-passu* with the irrigation infra-structure development, as otherwise the cultivators unaccustomed to irrigation will be inconvenienced to properly manage the water and the land resources and the hitherto rain-fed agricultural lands will degrade due to the development of salinity and water logging, besides causing other adverse impacts. Such a '*Pari-passu*' clause can be seen from the Environmental clearance letter issued by the Ministry of Environment and Forests⁵ for the Sardar Sarovar Projects in Gujarat and Rajasthan and the Indira Sagar Project in Madhya Pradesh. The Environmental clearance of these projects was done in 1987 and CAD plan was to be in place by December 1989. The Environmental clearance to the Omkareshwar project was granted in the year 1993⁶. One of the conditions of clearance was the preparation of a **detailed Command Area Development (CAD) plan** by March 1994.

Against the MoEF's condition of preparing the CAD Plan by March 1994, the 'Brief Interim Report of CAD Plan including EIA/EMP Studies' dated October 2009 with respect to the Left Bank Canal (LBC) of the Omkareshwar project was made available

³ Fourth Report of the Standing Committee on Agriculture of the Eleventh Lok Sabha on the Demands for Grants (1996-97) of MoWR.

⁴ Twelfth Report of the Standing Committee on Agriculture of the Eleventh Lok Sabha on the Demands for Grants (1997-98) of MoWR

⁵ Letter of Clearance for SSP (Guj), SSP (Raj) and ISP (MP) from MoEF dated 24th June 1987.

⁶ Letter of Clearance for OSP (MP) from MoEF dated 13th October 1993.

to some of the members of this Committee on 30th January 2010 when the Project Authority presented the plan. Along with this, the Draft EIA and EMP, the Draft Report of the CAD with Draft Annexures and the Draft of the Socio-economic Report: all with respect to the Indira Sagar Project and all dated August 2009 were also circulated by the Project Authority on 30th January 2010. Some other members got these documents by post near about the same time. **More recently, on 19th March 2010, a few documents pertaining to the designs and maps of field drains and on-farm development works for three distributary commands namely, Gudariya, Roopkheda and Neelkantha, were also made available to this Committee. All the three are related to the Indira Sagar project.** Upon examination of the Brief Interim Report of CAD Plan of the Omkareshwar project during the meeting of this Committee on 30th January 2010, as presented by the Project Authority, the implementable (micro) plans with respect to distributary-wise commands were not received.

B1. FEATURES OF BRIEF INTERIM REPORT OF CAD PLAN OF OMKARESHWAR PROJECT

In the above mentioned report, the 'Command Area Development Programme' has been discussed in Pages 24 through 77. At certain places in this document some references have been given to substantiate various project components but This Committee has not been provided with the reports under such references.

With respect to irrigation component, the CAD plan endeavours to construct necessary distribution net work up to 8 ha chak and this is as per standards followed in many command areas. The map showing the irrigation distribution network is not made available to this Committee.

With respect to drainage component, the CAD plan endeavours to provide surface drainage facility at the field level comprising a system of open drains starting from the field and joining with the natural drains. It has been averred that: "The drainage system will be constructed simultaneously with the irrigated delivery system in any block of the command area". This is a good decision and inclusion of drainage in the CAD Plan and the decision to provide drainage infra-structure along with the irrigation infra-structure is appreciated. In this case also, no illustration, even through a sample map has been provided to this Committee.

The CAD Plan document avers that on-farm development works comprising land shaping/leveling, terracing, provision of sprinkler irrigation system along with drainage facilities, field irrigation channels, farm roads etc., will be done. Besides, the state Agriculture Department will be suitably strengthened to undertake extension activities to

educate the farmers on the benefit of on-farm development. Thus, the plan has followed the MoWR guide lines of command area development, **which comprise the engineering and other constructional and organizational aspects.**

The water management system in the command area will be based on conjunctive use of surface and groundwater. For this, additional dug wells and renovation of the existing dug wells with a view to reaching water utilization from surface water sources and groundwater sources in the ratio of 70: 30.

A dynamic crop plan has been proposed in the command area keeping in view the time taken by rain-fed farmers to come in tune with irrigated farming. The rest of the CAD document presents features of the soil, the study report on groundwater scenario after introduction of irrigation, further details of the water delivery system and some additional notes on some of the components of command area development.

B1.1 Adequacy of the Plan

This Committee feels that the form in which the brief interim report of command area development plan has been submitted, it may be considered as an 'Expression of Interest' of the project authority on the actions that have been envisaged to be undertaken for command area development.

Since the project was environmentally cleared in the year 1993, it is quite likely that some irrigation infra-structure has been developed. If that is so, it will call for simultaneous action on CAD. However, this Committee has neither been provided with information on the progress of irrigation development nor with progress of command area development.

The brief interim report is not supplemented by any illustration of the CAD works or even a sample case of the detailed plan (micro-plan) showing the design calculations, lay out of intended activities on CAD, costs and time schedule of the intended on-farm development works (the activity chart) vis-à-vis the irrigation infra-structure development.

The study on groundwater and conjunctive water use is quite thorough. The study has identified the number of additional groundwater structures needed and pumping requirement to maintain the 70 : 30 ratio of the use of surface water and groundwater. However, the energy scenario of the state and whether or not adequate energy availability could be ensured to energize the pumps to lift groundwater are not elaborated. Thus, it is not clear if the study results could be meaningfully adopted in the

command area. This is an important matter, as the text of the brief report given in pages 64 through 77 puts a great emphasis on groundwater development as a remedy to possible water logging and associated chemical problems after the introduction of irrigation in the command area.

The mechanism of maintaining 70 : 30 ratio of surface and groundwater use has not been clarified. The common experience in the country reveals that once irrigation water is made available, the tendency to use this water prevails predominantly. The CAD plan should give a programme of how groundwater use (to the extent of 30 per cent of the total crop water requirement) may be ensured. It is not clear if there may be some kind of rationing of the surface water delivery to the head of a chak to motivate the cultivators to resort to groundwater pumping from the existing wells and sink new wells to further exploit the available groundwater.

Apprehensions about possible drainage problems have also been lightened citing large fluctuation between pre- and post monsoon groundwater table, favourable topography and presence of permeable layer below a depth of 2 meter from the ground surface. While under rain-fed situation the problem of water logging may be minimal, the situation drastically changes under continuous flow irrigation and localized land development when much of the natural slope advantage may not be available. Therefore, timely completion of the drainage net work is essential and such a net work should be in place as soon as the irrigation starts. The brief report does not give any details of work plan to endure this.

Upon scrutiny of the brief interim report of command area development plan, this Committee feels that an implementable CAD plan has not been developed (or may have been developed but not made available to Committee for scrutiny). Such a plan gives time-targeted CAD activities, sample design calculations, itemized costs, the agency responsible for undertaking the various CAD activities, the items for which the onus is to be on the cultivators and the mechanism to motivate the cultivators to timely accomplish their share of the task. **Further, the submitted documents do not reflect any thought and corresponding proposed action on several other environmental aspects associated with bringing irrigation water to a hitherto rain-fed ecological system. Thus, the plans for the management (to contain to the minimum possible level) of the adverse impact on human health, flora-fauna, contamination of local surface water bodies and groundwater due to flow and leaching of nutrients and insect-pest controlling chemicals due to higher doses of application, which is expected when irrigation starts, are not discussed in report of CAD plan of the Omkareshwar project, made available to this Committee.**

B2. DRAFT REPORT AND ANNEXURE OF CAD PLAN FOR THE INDIRA SAGAR PROJECT

Section I of the report contains a Check List detailing the various components of studies and surveys required for preparing a command area development plan and the status of their progress. In these details, references of a study report of 1984 by Indian Institute of Science, Bangalore and separate volumes on OFD works have been made. **This Committee has been provided with the copies of the plans of Field Drainage and On-Farm Development activities in the command area of three distributaries (Gudariya, Rookheda and Neelkantha, as mentioned earlier)** for examination. The documents submitted do not specify the command areas under each of the three distributaries. The soil survey has been carried out by the state Directorate of Agriculture in coordination with the National Bureau of Soil Survey and Jawaharlal Nehru Krishi Viswavidyalaya. The check list avers that training of farmers on improved water management methods was not covered under the MOU and hence, perhaps it will not be done.

In Section II **very high field application efficiency of 80 per cent and above has been assumed for which no supporting field data were found.** An assumed unrealistically high field application efficiency will result in a shortfall of water available for irrigation and this may cause considerable deviation from the planned cropping pattern as well as area coverage under irrigation. Also, due to unavoidable losses during field application under flow irrigation system, the cotton crop planned over 40 per cent of the area in Zone I and Zone II may either be damaged due to excess water in the surface and in the root zone below the surface in some parcels and will be deprived of water in some other parcel of the command area. The crop plan does not reveal any intention to introduce water saving pressurized irrigation methods though the Government of India has been trying to propagate this method under the generally perceived constraint of water availability in the future and for checking physical and chemical degradation of command area soils under continued flow irrigation, which is inherently poor in overall irrigation efficiency, particularly the field application efficiency.

Section III presents the detailed project report, which contains, among other things, sub-sections on basic data, various survey results, groundwater, drainage and command area development and conclusions & recommendations.

From the data relevant **to develop plans for** the CAD, including OFD, it is found that almost 60 per cent of the command area is under level and very gently slope class and majority of the area amounting to more than 86 per cent comprises fine textured

soils in the range from gravelly sandy clay loam to clay. Of this, about 29 per cent of the land has predominance of clay. Thus, surface water congestion and drainage problem subsequent to introduction of irrigation may occur over 60 per cent of the command area in general and over 29 per cent of the command area in particular. Fortunately, the saline sodic area is reported to be a little less than 1000 ha at present. However, further development of saline and sodic soil condition after irrigation starts cannot be ruled out in view of the practice of flow irrigation, extreme summer temperature and presence of fine textured soil over large areas, which have impeded natural sub-soil drainage. Impeded natural sub-soil drainage is also revealed from very low basic infiltration rate, high bulk density and in some cases weak soil structure.

Against the above data and information background, the statement: "... there does not exist major problem of surface drainage." (Page 21, Page 67) may be valid at present when there is no irrigation. But this assertion cannot possibly be accepted to be valid after introduction of irrigation. The statement betrays a lack of appreciation of the post-irrigation scenario when the cultivators will practice micro-scale land leveling to properly distribute irrigation water and most importantly will practice flow irrigation, which will give rise to field losses of irrigation water leading to drainage problem. The statement also suggests that not much importance has been attached to the provision of surface drainage facility simultaneously with irrigation development, a fact in many irrigated command areas that has been causing occurrence of drainage and related problems. This fact had attracted the attention of the Standing Committee of the Parliament in the past leading to the feeling of 'serious concern' on the deteriorating production base of land in the irrigated commands in India, as mentioned earlier. For land development, a list of commonly used machinery and equipment is given in Page 32. The fact that '*Patela*' is an age-old but highly inefficient land leveling equipment has been overlooked and not even a mention has been made of the highly efficient laser-guided land leveler, which has been introduced in India some years ago and which has tremendous potential to improve field application efficiency crucial to make irrigation sustainable. Such laser-guided land levelers have been used in a few northern states with great benefit. It is also not clear as to how in absence of any field measured value, "the assumed value of 80 per cent field application efficiency appears to be acceptable" (Page 34).

The sub-section on Groundwater reveals its availability and generally under-exploited groundwater resources in the command area, with a few exceptions. Possibility of water logging has been planned to be countered by developing groundwater and ensuring 65 : 35 or 70 : 30 proportion of use of surface water and groundwater (Page 66). The conjunctive water use policy stipulates an annual draft of

1.6 ha m per well and 400 hours of annual pumping using 3 HP pump set. Accordingly, well density has been proposed (Page 66). However, the energy scenario is not known to this Committee and, therefore, feasibility of translating the proposed groundwater development plan cannot be commented upon.

It has been mentioned that the post monsoon groundwater table depth is deeper than 5 m in the alluvial plains along Narmada River but in most of the remaining area (not specified) it is between 2 and 5 m and in certain pockets it is shallower than 2 m. Besides, the water table has been seen to go down sufficiently fast in a span of 1 – 2 months (Page 67, 68). These are the current features of the command area before the introduction of irrigation and under an annual average rainfall of about 900 mm. According to the information on overall delta (Page 159), is 780 mm. Thus, the command area will experience an annual water input of 1680 mm after introduction of irrigation. The current situation of groundwater table depth, surface water logging, salinity and alkali condition, **micro-climate and the situation of flora and fauna in the command area** are sure to change for worse after irrigation starts, particularly in the region where the present groundwater table depth is 2 – 5 m or shallower. This aspect of the probable post-irrigation scenario does not seem to have been considered seriously. The time bar chart in the Annexure 17 shows that the Detailed survey, Preparation of plans for OFD works, Construction of OFD works, Construction of field drains, etc., are to be taken up between the year 2010 and 2020. In contrast, the total irrigation potential is planned to be achieved by the year 2013. Obviously, there will be a large number years after project completion during which the CAD and the OFD work will be in progress but the entire command area will receive irrigation water. Incidentally, the year of completion of the project (2013) is the third year of the OFD works in a total of 9 years of planned OFD activities. This is not *pari-passu* planning of irrigation development and command area development, as stipulated in the clearance letter issued by the Ministry of Environment and Forests.

B2.1 Adequacy of the Plan

Section 3.1.14 presents the Command Area Development Plan in very brief mentioning therein that the plan has been developed in accordance with a communication between the Secretaries of the MoWF and the MoWR and certain other guide lines have been followed in preparing the plan. **The field drain and on-farm development plans in three distributaries commands (mentioned earlier) made available to this Committee is incomplete in the sense that these only deal with a few of the standard CAD activities and have ignored most others.** It may however

be stated that the salient features of the command area development and on farm development activities have been presented in the document in different sub-sections. This Committee's views on such proposed activities have been given above under the title: **"B2.The draft report and annexure of CAD plan for the Indira Sagar project"**

C. CONCLUSIONS

The Honorable Supreme Court of India has passed orders on 25 Feb. 2010, assigning the Committee the responsibility of examining the CAD plans submitted by the Govt. of Madhya Pradesh for ISP and OP, and to give its comments. Therefore, the Committee feels obliged to make a definitive assessment on the basis of the documents provided to the Committee by the State Government.

The Hon. Supreme Court has also mentioned in the said order that according to the State Government, a comprehensive command area development plan was submitted to the MoEF in 1992. Therefore, the Committee has also taken cognizance of this document, and notes that the plan submitted by the State Government to the MoEF in 1992 dealt only with the Omkareshwar Project and did not cover the Indira Sagar Project. The CAD plan for Omkareshwar project was examined by the MoEF and found inadequate that is why in the clearance order of 1993 submission of CAD plan was stipulated.

For reasons detailed above, the Committee does not consider the draft command area development plans for Omkareshwar and ISP, submitted to the MoEF by MP in October 2009, as adequate in terms of the conditions laid down as part of the environment clearance, and the subsequent stipulations by the MoEF and the NCA ESG. These plans details only some of the engineering aspects of the command area development activity and **the environmental safeguard measures essential for sustainable irrigation development has not been dealt with. Similarly the impact of construction of canal is not provided in the plan and therefore the committee could not assess the impacts of construction on environment such as loss of biodiversity, noise, water and air pollution etc. Therefore, these plans are incomplete and can not be approved.**

Annexure II

List of documents perused

1. Comprehensive Command Area Development Plan of Omkareshwar Multipurpose Project, Khandwa, MP; April 1992.
2. Consize Plan: Omkareshwar Project Madhya Pradesh, Command Area of Right Bank Canal: Environmental Impact Assessment and Management: May 2010.
3. Draft updated CAD Plan for Omkareshwar Project, MP.
4. Annexure to the above.
5. Design of OFD works pertaining to the above.
6. Plan for Completion of Omkareshwar Canal Project presented before the Committee on 31st October 2010.
7. Omkareshwar Project Canal presented to the Committee prior to the field visit in October 2010.
8. Reply to the points raised during field visit on 29th October 2010.