Crystal Water 2002

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Training Group Name	Domestic/Regional Problems	Contents (Subjects) to be studied in each unit	Results of Training	Additional Information Hoped for
Execution Case of E.I.A. (Aug.5-8)	1.Apathy against high dams; 2.Rehabilitation & Resettlement problems; 3.Environmental concerns in regard to large scale inter-basin water transfer;	1.Integrated development of large and small dams; 2.Appropriate EIA for large dams; 3.Appropriate EIA for inter-basin water transfer schemes; 4.Execution case of EIA in Japan for a large dam with inter-basin water transfer component;	I learnt the basic concepts of EIA and its various stages such as screening , scoping etc. I also learnt about various world -wide conventions, declarations & policies on EIA, Japanese Environmental Impact Assessment Law and the environmental guidelines of Japan International Cooperation Agency (JICA) on Roads. Further, the case studies on watershed management in Karoon river basin of Iran, Sunsari irrigation project in Nepal, Karaj multi-purpose project near Tehran in Iran, Dar es salaam Road Development Plan and Makuyani - Ngorongoro Road Rehabilitation project in Tanzania exposed me to the practical considerations applicable in the EIA of such projects.	I hoped to know about the EIA in respect of a large dam with inter-basin water transfer component through a case study since my organization is entrusted with the feasibility studies of the inter-basin water transfer link projects involving large dams.
Water Storage and Supply Facilities (Aug.12-16)	1.Storage and supply system under severe strain to provide satisfactory service; 2.Potential utilized is less than the potential created; 3.Inequitable distribution of water between head and tail end farmers; 4.Conflicts in the use of water between project beneficiaries and those dependent on committed releases downstream; 5.Inter-State water disputes	1.Appropriate water pricing technique with due regard to interests of marginal farmers; 2.Control of seepage and evaporation losses; 3.Command area development approach; 4.Rotational water distribution system; 5.Participatory irrigation management; 6.Formation of River basin organizations and their strengthening;	I learnt about the basic concepts of Roller Compacted Dam (RCD) and Sub -surface dam. I could get a fair idea of the sedimentation problems in the reservoirs and the history of dams in Japan & the World . The destructive and non-destructive tests of diagnosing deterioration in concrete were explained. The durability of concrete soaked in drainage water of salt accumulated fields based on the water quality data of drainage water in Hetao irrigation area of Inner Mangolia in China was discussed. Also, examination of analytical condition in generative prediction for thermal crack of RC Box culvert was explained which highlighted the significance of autogenous and drying shrinkage and the presence of bond links between the ground and the boundary surface of the concrete in such analysis .It was quite interesting to know about the ongoing research on the re use of rice husk (carbonated), rice straw and wheat straw as construction materials. The seepage analysis of an earth dam using Casagrande method and the slope stability analysis were also explained. Finally, the field visit to Togu concrete gravity dam, Yajita in-take weir, control facility at Nishitakao dam, Senjohzan fill dam , farm pond (FP 2-1) & tube irrigation in the command was very useful in understanding the planning, construction and management techniques adopted in these project systems.	I understand that the storage and supply problems which I listed are mainly relevant to the large projects (major & medium) and the irrigation systems in Japan are quite small .The Storage and supply facilities of these small systems are being managed by the land improvement districts effectively without scope for disputes through mutual trust & understanding. 'Control of seepage and evaporation losses in the reservoirs' is one aspect that I feel needed discussion in the course.
Farm / Forest Management and Food Policy (Aug.20-24)	1.30% of forest is degraded; 2.Large scale deforestation for developmental activities; 3.Requirement of 450 million tones of food grains by 2050 AD;	1.Better management of farm/forest; 2.Development of high yielding varieties; 3.Developments in Bio-technology; 4.Improved input management and agricultural practices; 5.Inter-basin water transfer to support the food grain production;	The significance of farming survey (base line survey etc.) in knowing the conditions and problems of farmers prior to taking up a development project is understood. Such detailed surveys are very useful and can be employed for better farm management in developing countries. The topics ' Computerization in farm management', 'Abundant world food supply' and 'Functions and financial evaluation of forests' discussed in the course have enabled me to perceive the Japanese perspective of these issues.	I feel that the main task of developing countries is to be self sufficient in food production keeping in view the increase in future population. The developments in bio-technology to develop high yield varieties of crops suitable to the conditions of arid and semi-arid regions and better agricultural practices to help conservation of water and improved farm management are hoped for discussion. Like wise, forest management strategy in the areas where it is currently being depleted for fire wood, construction etc. (as is the case in developing countries)

				needed discussion.
Ground Water (Sept. 3-6)	1.Over exploitation of groundwater 2.Quality deterioration in Irrigation commands, rural and urban areas;	1.Integrated development of surface and groundwater 2.Rain water harvesting 3.Artificial groundwater recharge; 4.Groundwater and runoff modeling	The Governing Equations for different two-dimensional and three dimensional groundwater flow conditions are understood. The factors for salinity intrusion, the investigation techniques for finding it and countermeasures against it, the causes and countermeasures in respect of groundwater pollution discussed in the course are quite useful. The topics on characteristics, components and design aspects of underground dam are very much interesting as these aspects are new to me. I hope to learn more about the practical aspects of it during the field tour to Okinawa. Further, different engineering methods for groundwater lowering, soil hydraulic properties, basic concepts of aquifer tests for confined , unconfined and leaky aquifers were discussed. Also, a no. of analytical problems were solved for finding out Hydraulic conductivity (K) and draw down (S) for different cases as above.I could get a fair idea of how an infiltrometer is used in the field through the demonstration of Guelph infiltrometer given in the lecture.	Rainwater harvesting and Artificial Groundwater recharge were discussed to some extent. Further, I hoped to learn about 'Integrated development of surface and groundwater (Conjunctive use)' and 'Groundwater and runoff modeling'.
Soil / Water Quality Assessment (Sep.9-12)	1.Soil cover degradation; 2.Uneven planning of cropping pattern without regard to soil conditions; 3.Pollution of surface and groundwater resources;	1.Proper soil classification; 2.Crop diversification methods ; 3.Geophysical and Geotechnical examinations in the context of inter-basin water transfer projects; 4.Polluter pays principle and its effective implementation; 5.Appropriate Techniques for soil and water quality assessment;	The causes of soil degradation, the concepts of saline and sodic soil formations are understood. The measurement of pH and EC for both saturation soil extract and 1:5 soil solution are carried out in the Laboratory for appropriate classification of the given soil sample. The importance of reuse of treated sewage water for agriculture is understood in the context of water scarcity in arid and semi-arid areas. The field visits to Inaba compost center, Togo town sewage treatment facilities (Intermittent filter type, Rotary drum type, Contact aeration and oxidation ditch) have helped in appreciating well the ' three-R' principles –Reduction, Recycling and Reuse being practiced in Japan. From the visit to Tottori waterworks, it was of great interest to know the mechanism of drawl of sub surface water beneath Sendai riverbed for drinking purpose through pipelines to obtain stable quality water. The visit to Sanyo Electric company –LCD division was quite useful in understanding the process of Industrial waste water treatment and recycle& reuse of part of it.	The topics of 'soil classification' and 'soil and water quality assessment' are mostly covered. 'Crop diversification methods to improve soil quality' and the 'polluter pays principle and its effective implementation' are the other topics which I hoped to learn. From the viewpoint of my field of activity, I was also interested to know about the relevant soil investigations in the context of inter basin water transfer projects.
Field Water and Soil Management (Sep.24-Oct.3)	1.Low irrigation efficiency; 2.Water logging and Salinity problems in the project commands;	1.Control of seepage and evaporation losses; 2.Awareness among farmers for improved agricultural practices; 3.Involvement of NGOs in educating the farmers; 4.Soil nutrient management; 5.Soil conservation measures; 6.Realistic assessment of water needs for irrigation and other purposes; 7.Drainage as an integrated component of project planning; 8.Preventive and remedial measures for sustainable development;	The basic concepts of steady state salt accumulation in soil, continuous and intermittent ponding for leaching were discussed through case studies in Iran and China. Modern Irrigation methods like drip, sprinkler & sub surface irrigation and water conservation techniques like qanat & rainwater harvesting were introduced. How to evaluate management efficiency of Irrigation systems is understood applying parameters of adequacy, efficiency, dependability and equity was understood. The case studies of Rajangana scheme in Srilanka, Aral sea basin in Kazakhstan and irrigation practices in Israel helped in appreciating the soil & water management concepts. The Penman-Monteith method (FAO) of estimating crop evapotranspiration was introduced. The basics of using satellite data for computing E_T were explained. Different methods of irrigation scheduling were analyzed. Estimation of consumptive use by soil moisture depletion method and tensio-meter method was explained. The estimatation of soil water storage, downward flux and soil hydraulic properties were understood through a practice session. I got a basic idea of functioning of Neutron probe, Theta probe, tensio-meter, lysimeter,	Almost all the contents hoped for under the purview of this subject were touched upon

			four-electrode sensor, Time domain reflectometry (TDR). The merits and demerits of Drip irrigation and the emitters (self-controlled & others) were understood. Case studies on desertification due to irrigated agriculture in China, Secondary salinisation in river water in Iran and irrigation possibility in Sahelian region in Africa were helpful in understanding the problems in these regions, factors responsible for the problems and the suggested countermeasures. The ongoing Lab study technique on using Zeolite for soil improvement was also discussed.	
Design and Practice in Water Supply / Service System (Oct.8-10)	1.High rate of reservoir sedimentation; 2.Silting in water supply system; 3.Complexities in operation of the system;	1.Design of irrigation structures; 2.Optimization & simulation in reservoir operation; 3.Proper management of water supply and service system;	The functioning mechanism and advantages of automatic pressure reducing valve, variable constant flow valve, float type constant flow valve, non-water hammer check valve and self priming pump are understood through lectures and hydraulic experiments in the lab at M/s Yakota, Hiroshima. The basic concept of functioning mechanism of Hokoku automatic watchman gate was understood through lectures. The head works of Southern Okayama Irrigation & Drainage Project , Watchman gate on the main canal were visited. The generation and use of eco-friendly solar energy & solar heat in the Hokoku head office is appreciated.	The course partly covered the management and regulation of water supply through valves and gates. The topics on 'design of irrigation structures' and 'optimization and simulation of reservoir operation' were hoped for.
Crops Suitable for Arid Area; Plant Nutrition (Fertilization) (Oct.15-17)	1.Increasing future food grain demand (450 million tones); 2.Limited possible irrigation development by conventional methods (140 Mha); 3.Need for extending irrigation to new areas to cope with the demand;	1.Identification of crops suitable for the conditions in arid and semi-arid regions of India; 2.Soil-water-crop-fertiliser management; 3.Land use/crop planning through remote sensing techniques;	I gained basic knowledge on the characteristics of some drought tolerant and salt tolerant crops that are suitable for cultivation in arid conditions. Through the visit to the 'Paradise Park' I acquired knowledge about the 'Sedum' plant, which requires very less water for growth and is useful for heat insulation, slope stabilization and greenery. I learnt the basic procedure of 'Hydroponics (Nutriculture)' through experiment in the lab. From the visit to the 'Tottori Kinoko center' I am benefited with the preliminary knowledge on how the cultivation of mushroom (Shiitake variety), which is vital for health and strength, is carried out in Japan.	I hoped to learn about ' land use / crop planning through remote sensing techniques'.
Preservation of Greens; Assessment of Vegetation (Oct.28-Nov.1)	1.Rapid urbanization and consequent loss of fields and green tracts of land;	1.Afforestation; 2.Agro-forestry;	I gained basic knowledge in the classification of arid and semi-arid areas, causes and characteristics of arid areas and aspects of revegetation. I also learnt the concepts of aridity index, natural environment of sand dune and their fixation. I understood the concepts of die-back phenomenon and effect of drought and flood conditions on the woody plants. Further, I acquired the preliminary knowledge on crisis and need for protection of bio-diversity, ecological impact assessment and mitigation planning. I got useful knowledge on the basics of remote sensing, aerial photography and their applications. Finally, I understood the concepts of tree ring analysis, skeleton plot method and application of tree ring analysis in Dendrohydrology	

Remark:

The ideas shown in this table and the courses listed by the training staff in Tottori University are relevant to the region I came from.

Courses on E.I.A. and Appropriate Research methods are also very instrumental in my case and the region I came from.

SPECIAL EMPHASIS

Apart from the above outlined topics, I would like to highlight my priorities of learning from the training for kind consideration as follows:

The availability of water in INDIA is highly uneven in both space and time. Precipitation is confined to only four monsoon months from June to September in a year and varies from 10 cm in the western parts of Rajasthan to over 1000 cm in Meghalaya. As a consequence, the country is affected by flood – drought syndrome. One-third of the country is drought prone while floods affect an area of 9 million hectares per year. Scarcity conditions (< 1000 cum per capita) already exist in some parts of the country. The future food grain demand scenario (450 million tonnes) warrant an irrigation development of 160 Mha by the year 2050 AD. Most of the possible and favourable sites for large storages have already been exhausted.

Therefore, in order to cope with the food demand, irrigation has to be extended to new areas (mostly arid and semi-arid) and alternative sites/possibilities need to be explored. Inter-basin water transfer is considered to be one of the solutions in the long term planning of water resources development, the benefits of which include irrigation, hydro power, flood management etc. National Water Development Agency, an organization under the Union Ministry of Water Resources is entrusted with carrying out feasibility studies for the National Perspective Plan on inter-basin water transfer. As an employee of NWDA ,I am associated with the studies pertaining to inter basin water transfer since 1983.Therefore, I would like to learn the EIA with regard to large dams and inter-basin link projects, design of irrigation structures, optimized operation policies of reservoirs for meeting the complex and conflicting demands, water management and conservation techniques in the drought prone areas(arid/semi-arid) on priority by sharing Japanese experiences in these fields.