Minutes of the 15th meeting of the Sub-Committee on "System Studies for identification of Most Appropriate Alternative Plan" held on 16.06.2020 at 11.00 AM through video conferencing from New Delhi.

The 15th meeting of the Sub-Committee on "System Studies for identification of Most Appropriate Alternative Plan" was held on 16.06.2020(Tuesday) through video conferencing under the Chairmanship of Prof. P.B.S. Sarma (Retd.). The list of the participants is given at Annex:1.

At the outset, Chairman of the Sub-committee extended warm welcome to all the members of the Sub-committee and other invitees. He introduced and welcomed Shri Muzaffar Ahmad, Director (Tech) of NWDA as the new Member Secretary of the Sub-Committee. He also expressed thanks on behalf of all the members to Shri K. P. Gupta , Chief Engineer, (North) , who has been Member secretary of the Sub-Committee for over 4 years. After a brief background, Chairman requested Shri Muzaffar Ahmad, to take up the agenda items for discussion.

Item 15.1: Confirmation of the Minutes of 14th Meeting of the sub-committee on System Studies for identification of most appropriate alternative plan held on 18.02.2020

The Member Secretary informed that the Minutes of the 14th Meeting of the Sub-committee were circulated to all the members vide letter dated 28.02.2020. The comments of Shri M. K. Sinha have been received and were put up for consideration of the members of Sub-committee. In light of the comments of Shri M. K. Sinha, the modified minutes of 14th meeting of the Sub-committee were confirmed after taking comments of Shri M. K. Sinha on record.

Item 15.2: Consultancy proposal of NIH for the suggested studies related to Mahanadi-Godavari link

After signing of MOU with NWDA in March, 2020, National Institute of Hydrology(NIH) has started the work of system studies of Mahanadi- Godavari link. The Inception Report has been submitted by NIH on 05.06.2020 and same was circulated to all the members of the Committee for their observations. Dr. M. K. Goel, Scientist-G, NIH, Roorkee and his team gave a detailed presentation on Inception Report covering study area, data requirements, approach and methodology being adopted in the assigned study . He informed that the main objectives of the study are:

i) Set up a generic model for representation of canal system

ii) Assessment of present Ground water scenario in the project command area.
iii) Assessment of Ground Water recharge due to the Mahanadi-Godavari link over a period of 50 years.
iv) Assessment of crop water requirements
v) Impact of Climate Change on the water availability and demand pattern of the water in the command
vi) Additional Area to be irrigated due to increased availability of GW by conjunctive use of Surface and Ground Water resources.
vii) Generation of various scenarios considering various inflows and demands

The above aspects will be considered for three scenarios viz., considering (i) Contribution of Mahanadi river only (ii) Contribution of MSTG link with Farakka – Sundarbans link and (iii) MSTG link without Farakka-Sunderbans link.

For ground water analysis, NIH proposes to use MODFLOW software which is commonly used. For assessing the crop water requirement, they plan to use CROPWAT 8.0 model. For generating climate change scenarios, latest CMIP6 GCMs shall be utilized.

He further requested NWDA to furnish data on district wise ground water scenario of the command area, design parameters of the link canal, long-term meteorological data, existing and proposed water use efficiency, etc.

Prof. P.B.S. Sarma made few observations on the approach of NIH in the study regarding decadal variations in groundwater conditions, engagement of soil scientist/agronomist in their work etc. He also emphasized that economic analysis should be an integral part of the generic model being developed for Mahanadi-Godavari link. In this regard, it was clarified by NWDA that developing conducting economic model analysis is not in the scope of current study being carried by NIH and it can be taken up separately by NWDA

Prof. Sarma also suggested nominating two officers of NWDA to work with NIH so that NWDA officials can also be trained in the work.He also suggested that in order to minimize irrigation water demand, appropriate crops can be selected with the help of soil scientists and agronomists.

Shri J.V. Tyagi, Director, NIH, Roorkee suggested that Dr. Gopalakrishnan, Scientist (F), NIH can be included as soil scientist in their study. He also raised the issue of the drainage congestion, conversion of paddy fields into aqua farms by farmers along East coast.

Prof. P.B.S. Sarma also pointed out that a list of the NIH scientist involved in the study alongwith the precise responsibilities and the commitment of time of each scientist needs to be clearly given in the report.

Prof. P.B.S. Sarma further mentioned that Dr. S.K. Jain, Former Director, NIH had rightly stated in the last meeting of the sub-committee that NPP started in eighties and since then many scientific and engineering advancements have taken place. In this regard, NWDA should take up the matter with Ministry of Jal Shakti for organizing a Brainstorming session to incorporate the latest developments in the NPP.

Dr. S. Mohan, Professor, IIT, Madras suggested to include the reservoir operation as integral part of model to arrive at a good model in which both GW and SW are accounted. He also requested to consider the sea level changes in addition to precipitation and temperature parameters.He emphasized that return flow to the canalis a very important aspect and needs to be considered in the study by NIH. He stressed that what NIH is developing is generic model and not a proprietarymodel, New techniques and approaches such as artificial intelligence need to be adopted.

Dr. S. K. Jain Former Director, NIH, Roorkee mentioned that groundwater levels willvary widely over the command. There is a need tostudy the impact of canal irrigation oncrop yields and to analyse whether the same cropping pattern can continue with or without the canal irrigation.

Shri Bhopal Singh, DG, NWDAsuggested that the study may be renamed as **"System Studies of Mahanadi-Godavari link".** He felt that inthe inceptionreport, pros and cons of various models available for system studies, groundwater, crop water requirement and climate change etc should be analysed and most suitable models be recommended for use in the study.. Though, models proposed to be used for ground water analysis, crop water requirement and climate model have been mentioned in the report, the overall system model proposed to be used is not mentioned. A simple model representing canal network schematization would not be sufficient. The system model will be core of the current study as conveyed earlier in March and also mentioned in the MOU. For system studies,a robust model which covers all components of the system like supply, reservoirs, water conveyance system, diversions points, demand points etc is required WEAP model which is a very comprehensive system model and is freely availablefor use in India may be tried. He also suggested that run time for system model should be minimum 10 days as system would run largely run-off-river mode. He also suggested that for climate change, Indian source data should preferably be used to the extent possible. He further suggested that one expert from CGWB should also be involved in the studies as groundwater is a major component of the studies.

Shri M. K. Sinha, Assessor, KWDT suggested that the crop water requirement should be worked out for the proposed cropping pattern given in the Feasibility Report of the "Mahanadi-Godavari Link" instead of existing cropping pattern. Since Manibhadra Dam site has been dropped and in its place, Barmul dam site in upstream of Manibhadra, has been chosen as headworks, additional command created as a result of this change should also be accordingly accounted for, while working out Crop water requirement.

Regarding conjunctive use of surface and ground water, NIH was of the view that after working out the quantum of additional ground water available as a result of application of irrigation water through MG link, conjunctive use of surface and ground water would be suggested. Shri M. K. Sinha told that division of command areas into three parts, i.e., upper, middle and lower commands by NIH for study purpose clearly showed that upper command has ground water at shallow depth, showing more availability of ground water while lower command (or command at tail end of link canal) has ground water at higher depth showing sign of less availability of ground water. As such Shri M. K. Sinha suggested to have conjunctive use of surface and ground water starting from upper command.

Regarding additional irrigation potential to be created from additional quantum of ground water available due to recharge should not be taken as there is need for transfer of surplus water to southern basins .

Dr. R. N. Sankhua, CE(S), NWDA suggested that if use of 1:50000 toposheets due to volume of work is difficult then the usage of 1:250000 toposheets of the study area can be considered. However, Dr. M.K. Goel, Scientist (F), NIH has informed that they are having Cartosat data and same shall be used

Item 15.3:Proposal for taking up the system studies of other links.

Shri Muzaffar Ahmad, Director(T), NWDA and Member Secretary gave a brief background of the discussions held in the last meeting of the Sub-committee in February, 2020 regarding taking up system studies of few more links. DG, NWDA suggested taking up system studies for Manas-Sankosh-Tista-Ganga, Ganga-Damodar-Subarnarekha, Subarnarekha-Mahanadi links system at first and thereafter Godavari-Krishna-Pennar-Cauvery-Vaigai-Gundar links at second phase, so that entire eastern and southern linkage is covered. Chairman and members of the Committee agreed with the proposal. It was suggested in the meeting an expression of interest (EOI) may be sought from institutions/agencies working in the field like NIH, Roorkee, WAPCOS, IITs/IISC,

etc., indicating broad terms of references and scope of works. It would be appropriate to adopt an appropriate system model and use in all studies.

Shri M. K. Sinha while agreeing to the above study suggested that primary purpose of such system studies should be how much water would be available and can be transferred from one river basin to another.. Ground water recharge assessment and assessing climate change impact may not be required in each study and should be our secondary concerns.

The meeting ended with a vote of thanks to the chair.

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Annex-I

List of participants of the 15th Meeting of the "Sub-Committee on System Studies for identification of most appropriate alternative plan" held on 16.06.2020, New Delhi.

1.	**Prof. P.B.S. Sarma,** (Retd.), CED, IIT Delhi, New Delhi	In Chair
2.	**Prof. Sanjeev Kapoor**, IIM, Lucknow	Member
3.	**Dr. S. Mohan**, Professor, EWRE, Department of Civil Engineering, IIT Madras, Chennai	Member
4.	**Shri J. V. Tyagi,** Director, NIH, Roorkee	Member
5.	**Shri M.K.Sinha**, Assessor, Krishna Water Dispute Tribunal & Former Chief Engineer, CWC, New Delhi	Member
6.	**Shri Muzaffar Ahmad,** Director (Tech.),NWDA, New Delhi	Member- Secretary
	Special Invitees	
7.	**Shri Bhopal Singh,** Director General, NWDA, New Delhi	
8.	**Dr. Sharad K Jain**, Former Director, NIH Roorkee	
9.	**Shri R. K. Jain,** Chief Engineer (HQ,), NWDA, New Delhi	
10.	**Dr. R. N. Sankhua,** Chief Engineer (South), NWDA, Hyderabad	
11.	**Shri K.P. Gupta,** Chief Engineer (North), NWDA, Lucknow	
12.	**Shri N.C. Jain,** Former Chief Engineer, NWDA, Lucknow	
13.	**Dr. M. K. Goel,** Scientist - 'G', WR Division, N.I.H., Roorkee	
14.	**Dr. Vishal Singh,** Scientist-C, NIH, Roorkee	
15.	**Dr. P.K. Singh,** Scientist-D, WR Division, NIH, Roorkee	
16.	**Dr. Nitesh Kumar,** Scientist-B, GW Division, NIH, Roorkee	
17.	**Dr. Surjeet Singh** Scientist- F, GW Division, NIH, Roorkee	

Other Officers from NWDA		
18.	**Shri B. L. Sharma,** Superintending Engineer, IC, NWDA, Bhubaneshwar	
19.	**Shri Anil Kumar Jain,** Deputy Director (Tech.), NWDA, New Delhi	
20.	**Shri R. Balakrishnan,** Assistant Director,NWDA,New Delhi	