Geological Survey of India
New Delhi

International Geoscience Programme Project No. 582

Tropical Rivers
Hydro-physical Processes, Impacts, Hazards and Management
(2009-2013)

MINUTES OF THE SECOND MEETING OF NATIONAL WORKING GROUP

1.0.0 The second meeting of National Working Group of IGCP 582: Tropical Rivers, Hydro Physical Processes, Impacts, Hazards and Management was held on 3rd August 2011 in Committee Hall, Director General's Camp Office (DGCO), Geological Survey of India, Pushpa Bhawan, Madangir Road, New Delhi – 110062. Dr. V.P. Mishra, Deputy Director General, PSS and Chairman, IGCP 582 chaired the meeting. The list of NWG members and special invitees who attended the meeting is given in Annexure-I.
Amongst the NWG members Dr. Ahmad S. Masood, NGRI, Hyderabad, Dr. Rakesh Kumar, IIH, Dehradun, Dr. Pradeep Srivastava, WIHG, Dehradun, Prof. Rameshwar Bali, Lucknow University, Dr. V.K. Srivastava, ISM, Dhanbad, Shri M.K. Shukla, GSI, Lucknow, Shri N.V. Venkatraman, GSI, Chennai, Dr. M. S Bodas, GSI, Pune, Shri. Rajesh Kumar, GSI, Kolkata, Shri. N. R Mohapatra, GSI, Kolkata could not attend the meeting.

1.0.1 **Welcome address by the Convener**
Dr. Snigdha Ghatak, Convener, IGCP 582 welcomed Dr. V.P. Mishra Dy. D.G, PSS, DGCO, New Delhi, & Chairman IGCP 582; Prof. Rajiv Sinha, IIT, Kanpur & International leader of IGCP 582 and INC member; NWG members, invited speakers, guests and members of the organizing committee. She underscored the immense scope of project and its potential of addressing several key issues like river management, risk reduction of urban agglomerates (by introducing flood control models), role of smaller tropical river basins in the overall hydrodynamic regime and the correlation of landform evolution vis-à-vis the fluvial and sedimentary processes.
She also raised a note of concern in light of insufficient representation of the NWG members in the meeting and expected better participation in future from the members.

1.0.2 **Self introduction by the participants**
The NWG members and invited delegates introduced themselves to the delegates and guests and gave brief overviews of their research activities.

1.0.3 **Opening remarks and welcome address by the Chairman IGCP 582**
Dr. V.P. Mishra Dy. D.G, PSS, DGCO, New Delhi and Chairman, IGCP 582 welcomed Prof. Rajiv Sinha, INC member and Project Leader, NWG members and other distinguished scientists and guests. He suggested having constant interaction within the IGCP 582 group and other experts till the completion of the projects for the benefit of the society at large. He also expressed his confidence in IGCP 582 for shaping up as a nodal group for other agencies in carrying out premier scientific studies.

1.0.4 **Opening remarks by Dr. S.K Wadhawan, Director (Tech), Ministry of Mines**
Dr. S.K Wadhawan, Director (Tech.), MoM appreciated the work of the group with special reference to the convener's effort and suggested to incorporate convener's report in the deliberation document at next NWG meet. He emphasised that the NWG members should also reflect the academic outputs of their respective institutions to strengthen the database of the IGCP-582 project. He also requested Prof. Rajiv Sinha to guide the group to bring the research activities on an international platform with cutting edge technologies.

1.0.5 **Opening remarks by Dr. Virendra Kumar, Director, DGCO**
Dr. Virendra Kumar briefed the delegates and other guests upon the aims and objectives of the project and wished the group success in their future endeavours.

1.0.6 **Opening remarks by Shri. Gautam Dasgupta, Director, DGCO**

Shri. G. Dasgupta emphasized on the socio-economic relevance and the global context of the project. He advised the group to formulate certain projects which can bring out the Indian scenario on water management, flood control measures etc. from India. He added that implementation of the projects under GSI field season programmes should be encouraged and monitored through the CGPB secretariat. He also encouraged to come up with good quality special publications under the aegis of IGCP 582.

1.0.7 **Opening remarks by Shri Sanjiv Sharma, Director, DGCO**

Citing the importance of the IGCP- 582 project, Shri. Sanjiv Sharma shared his experiences garnered during his work on glaciology. He explained how the frequency of rain gauge stations could be of help for hydrometeorological studies. He mentioned the positive and negative impacts of hydroelectric projects on the sediment –water budget, flooding consequences of the river, with instances from different hydel projects.

1.0.8 **Release of volume on Contributions for 2nd NWG Meet of IGCP 582**

Dr. V.P. Mishra Dy. D.G, DGCO, New Delhi and Chairman IGCP 582; Prof. Rajiv Sinha, Project Leader and INC member and Dr. S.K Wadhawan, Director (Tech), MoM jointly inaugurated the volume on contributions for 2nd NWG Meet of IGCP 582 consisting of the research papers/abstracts submitted by NWG members and special invitees. Prof. Rajiv Sinha congratulated the convening group in producing the document in a limited time and in a good quality.

1.1.0 **Technical session I: Key note address**

1.1.1 **Keynote Address and invited lecture by Professor Rajiv Sinha, Member, INC and Team Leader for IGCP 582**

Professor Rajiv Sinha delivered the Keynote Address on 'Avulsion threshold and plan form dynamics in a large Himalayan river: case study of Kosi River'. He emphasised on importance of river basin study with special reference to societal needs and their apprehensions. He pointed out at the growing awareness among masses regarding various effects of global climate change, shifting trends of river system etc., which are all affecting day to day life of common populace. Dealing with avulsion which is actually a rapid shift in the course of a river system, he elaborated with a case study of Kosi River which has witnessed several episodes of avulsion since 1731 till date, the largest being 120 kms eastward shift triggered by the breach of the eastern afflux bund at Kusaha in Nepal. He also discussed the anatomy of avulsion, hydrological variability, peak discharge, stream power, sedimentary supply, morphological reasons etc. which all influences the avulsion factor. While discussing models for avulsion threshold he opined that future of avulsion can be predicted based on such models along with factors already explained earlier.

1.2.0 **Technical Session II: Invited lectures and presentation by the National Working Group members**

1.2.1 **Dr. Snigdha Ghatak,** Convener, IGCP 582 delivered a talk on 'Tectono-Climatic controls on Fluvial Sedimentation of upper and middle reaches of Tapi River basin, Central India'. Her talk was focussed on the anthology of the Tapi River from east to west direction over a river course length of nearly 100kms. With the aid of field evidences and analytical data she presented a vivid description of the sedimentary history in the middle reaches of Tapi basin, where tectonic activity and sedimentation has gone hand-in-hand.

1.2.2 **Dr. Kalyan Rudra,** West Bengal Pollution Control Board, gave a presentation on 'Understanding Dynamics of the Ganga System in West Bengal'. He emphasised on giving impetus to research oriented studies to understand geomorphic processes involved in Gangetic delta. He elaborated upon the changing dynamics of the River Ganga at the apex and the estuary, which has resulted in land re-allocation problems causing border disputes between states of Jharkhand and West Bengal and has created a class of environmental refugees.

1.2.3 **Shri Vikrant Jain,** Department of Geology, Centre of Advanced Studies, University of Delhi, gave a lecture on 'Role of Geoinformatics in River Basin Management'. He discussed on the role of Geoinformatics and Digital Elevation Model (DEM) in analysing the fluvial processes and providing explanation for physical changes. This process based understanding of fluvial system provides an essential platform to develop stream management programme in which two applications of Geoinformatics viz. i) process based understanding of spatial variation in river processes & morphology and ii) dynamic nature of unstable channels have been used.

1.2.4 **Dr. Sreemati Gupta,** DGCO, GSI, New Delhi discussed on 'Spatio Temporal Variation of Sediment Loads of Teesta River'. Teesta River which is a major tributary of River Brahmaputra flowing through mountainous terrain debouches onto plains near Sevoke in West Bengal. This flood prone river has been changing its course with consequential effects on sediment load discharge of the river. Data for twelve years on river discharge and sediment yield data collected by CWC were analysed for three different sites, viz Chungthang, Sankalan and Khanitar in the mountainous region during monsoon and non-monsoon period to bring out the spatio-temporal variation in pattern of sediment load, relationship with river discharge, factors controlling sediment loads and correlate them with different geological and geomorphological, natural and man made factors and vice versa.

1.2.5 **Dr. Manohar Arora**, NIH, Roorkee provided a brief account on Climate Change and Himalayan Water Resources. Among the different causes that affect the concentration of greenhouse gases human activity influences the most. As per the recent IPCC (Intergovernmental Panel on Climate Change) 2007, the global average air temperature near Earth's surface rose 0.74±0.18°C in the last century. The changes in temperature in India/India-subcontinent over last century are also broadly consistent with global trend of increase in temperature. The three main 'categories' of climate impacts are those on agriculture, sea level rise leading to submergence of coastal areas, as well as increased frequency of extreme events. He also discussed on the various issues related to the impact of climate change on water resources of India for evolving the suitable adaptation strategies in the water resources sector.

1.2.6 **Prof. Ajay K. Katuri,** NWG, CEPT University, Ahmadabad made a presentation on 'Vulnerability Assessment to develop coping mechanism-people based perspective — a case study of Kosi region'. He touched upon disaster vulnerability which is a societal issue which started with an assessment of trend of disaster and damages faced and then narrowed down to case specific studies pertaining to Kosi River. Taking the factors of biophysical risk and social response within a specific area or geographic domain, his study attempted to establish the hazard of a place, identify and model the overall vulnerability of the place towards flood and then analyze the role of autonomous as well as planned coping, in reducing the vulnerability.

1.2.7 **Ms. V Ambili, GSI,** Trivandrum spoke on 'River drainage response to active tectonism: Evidences from Chaliyar River Basin, Kerala State, India'. The focus of the discussion was drainage basin evaluation of stream profile analysis, morphometry, morphostructural analysis, geomorphic indices & markers of active tectonism and their usefulness in appraising the influence of active tectonism in Chaliyar River basin. Results of the study showed that the river basin bears the imprints of recent morphological and structural adjustment of the stream channels due to its location in a zone of moderate to high tectonic activity.

1.3.0 **Technical Session IV: Future Action Plan for IGCP 582 project**

1.3.1 Dr. Snigdha Ghatak initiated the discussions for implementation of the IGCP 582 project in India. In light of the present progress of the work the following points were discussed and agreed upon by the house.

1.3.2 The list of Indian activities and related projects carried out by the NWG members under the aegis of IGCP 582 will be featured shortly in the international webpage of UNESCO as well as IGCP India Chapter website. Letters will be communicated to all the members to ensure their active participation (by 14.10.2011) for the project in terms of their previous and present work which can be a contribution to IGCP 582 project.

[Action: Convener, IGCP 582 and
Prof. Rajiv Sinha, INC Member and International Leader]

1.3.3 As was decided in the first meeting, the scheduled format containing data from different basins under activity –I could not be uploaded due to lack of response from the NWG members. Prof. Rajiv Sinha pointed out that the template for uploading data needs to be communicated to all the NWG members and non-NWG contributors for filling in the form and suggest modifications of the template. Dr. Snigdha Ghatak, Convener, IGCP 582 informed that the already prepared draft template will be communicated to all concerned.

[Action: Convener, IGCP 582]

1.3.4 The feasibility issues for taking up the projects as indicated in the minutes of the 1st NWG meeting were discussed and the projects were redefined with PI's, Co-PI's and group which is enumerated below.

Activity I: Multidisciplinary data base on Tropical Rivers: Reports, data and spatial information collection

Objective: Compilation of database for IGCP 582 India Chapter web page

River Basin	Title of the Project	Contributors (PI/Participants)	Remarks
Tapi	Compilation of database on flood/draught records, available hydrological parameters, vulnerability, geological-geomorphological maps, information, references	Dr. Snigdha Ghatak (PI) Dr. V.P Malaviya Shri. N. V Venkataraman	Template will be common for all *Narmada basin will be considered after receiving concrete proposal from Dr. V.P Malaviya (PI) **[Action: respective PIs and co-investigators]**
Narmada*		Dr. V.P Malaviya (PI) Dr. Snigdha Ghatak Dr. M. S Bodas	
Sabarmati		Prof. Ajay K Katuri (PI) Dr. Pradeep Srivastava	
Kosi		Prof. Rajiv Sinha (PI) Prof. Vinay Kumar Srivastava Prof. Ajay K. Katuri	
Teesta		Dr. Sreemati Gupta (PI) Dr. Snigdha Ghatak Prof. Ajay K. Katuri	
Ganga		Prof. Vikrant Jain (PI) Dr. Pradeep Srivastava	

Note: Due to poor response the projects on Kaveri and Khowai-Haora (NE), were decided to be dropped under Activity I

Activity II: Analysis and compilation of recent flood disasters, investigation of the causative factors and debate on the efficacy of the existing flood control measures

Objective: Basin scale analysis of flood and draughts and study of urban floods

River Basin	Title(s) of the Projects	Contributors	Remarks
Basin scale analysis:			
Kosi	Shall be finalized and communicated by contributors	Prof. Rajiv Sinha (PI) Prof. Vinay Kumar Srivastava Prof. Ajay K Katuri Shri. Arvind Singh, GSI, Patna (Non-NWG)	**[Action: respective PIs and co-investigators]**
Ganga	Shall be finalized and communicated by contributors	Prof. Vikrant Jain (PI) Dr. Pradeep Srivastava	
Urban floods:			
Ahmedabad city and its adjacent areas in Sabarmati basin	Shall be finalized and communicated by contributors	Prof. Ajay K. Katuri Dr. Snigdha Ghatak	Dy D.G PSS, DGCO assured to provide inputs for the project from GSI, WR **[Action: respective PIs and co-investigators]**

Note: The project on urban flooding on Mumbai will be considered after receiving feedback on the status of the project from Dr. M.S Bodas (PI) by 15th October.

[Action: Convener, IGCP 582]

Activity III: Analysis of hydro-geomorphologic parameters of global change and anthropogenic impacts on river systems

Objective: Holocene palaeoclimatic reconstruction using multi proxy approaches & Impacts of human intervention on river form and processes

River Basin	Title of the Project	Contributors	Remarks
Tapi	Tectono-climatic influence on fluvial form and processes in the upper to middle reaches of Tapi basin, Central India	Dr. Snigdha Ghatak (PI) Dr. V.P Malaviya	-
Narmada*	Shall be finalized and communicated by contributors	Dr. V.P Malaviya (PI) Dr. Snigdha Ghatak and Participation of one more officer from GSI, CR will be sought.	*Narmada basin will be considered after receiving proposal from Dr. V.P Malaviya (PI) **[Action: convener and Dr. V.P Malaviya]**
Teesta	Hydrogeomorphic evolution of the tectonically active Himalayan frontal foredeep along and around Teesta River and its tributaries	Dr. Sreemati Gupta (PI) Dr. Snigdha Ghatak Prof. Ajay K Katuri	Has been approved as an FSP item of GSI from DGCO, New Delhi

The project on Mahanadi and /or Mahananda will be considered after receiving feedback on the status of the project from Shri. Nihar Mohapatra (PI) by 15th October.

The project on Kali Basin, Eastern Kumaon or Ghagra basin will be considered after receiving feedback on the status of the project from Shri Manoj Shukla (PI) by 15th October.

[Action: Convener, IGCP 582]

PI- Principal Investigator

1.3.5 The issue of publishing the work being carried out for IGCP 582 project was discussed. Prof. Rajiv Sinha informed that a special issue of IGCP 582 is scheduled during December, 2011 in Palaeogeography, Palaeocology, Palaeoclimate, a peer reviewed international journal. He proposed publication of another special issue by mid 2012 for which he invited papers from the National Working Group Members.

[Action: Convener and all NWG members]

1.3.6 Prof. Rajiv Sinha, announced that the International meet and field workshop of IGCP 582 is scheduled during the month of December, 2011 at Kanpur. He encouraged all the NWG members for their participation and send papers or poster presentations for participation.

[Action: Convener and all NWG members]

1.3.7 A special issue/publication of GSI containing contributions of the NWG members and participants presented during the meetings was advised by Dr. S.K Wadhawan. The issue was decided to be released during the next CGPB.

[Action: Convener and all NWG members]

1.3.8 The issue of arranging training under the aegis of IGCP 582 was discussed and it was decided to send training proposal to GSI, TI with probable venue at Lucknow or Nagpur RTI of GSI.

[Action: Convener, IGCP 582 and NWG members]

1.3.9 Shri. Rajesh Kumar, Sr. Geologist, Kolkata expressed his inability to carryout work of IGCP 582. Name of Prof. Vikrant Jain, University of Delhi was proposed in lieu of Shri. Rajesh Kumar.

[Action: Convener, IGCP 582]

1.3.10 It was also proposed by Prof. Rajiv Sinha to include Shri Arvind Singh, GSI, Patna in connection with Kosi Project.

[Action: Convener, IGCP 582]

1.4.0 The meeting ended with vote of thanks by Dr. Sreemati Gupta, NWG member, IGCP 582.

Annexure- I

INTERNATIONAL GEOSCIENCE CORRELATION PROGRAMME (IGCP)

SECOND MEETING OF NATIONAL WORKING GROUP FOR IGCP 582 ON
"TROPICAL RIVERS HYDRO PHYSICAL PROCESSES, IMPACTS, HAZARDS AND MANAGEMENT"
3rd August 2011

List of participants

1.	Dr. V.P Mishra, Dy.D.G PSS, DGCO, GSI, New Delhi	Chairman, IGCP 582
2.	Prof. Rajiv Sinha , IIT Kanpur	Leader IGCP 582
3.	Dr. Snigdha Ghatak, Sr. Geologist, LHIM Div, GSI, N. Delhi	Convener IGCP 582
4.	S. K Wadhawan, Director, Tech, MoM	Special Invitee
5.	Prof. Ajay K Katuri, CEPT Ahmedabad	NWG member
6.	Dr. Sreemati Gupta ,Sr. Geologist , EPE Div. GSI, N. Delhi	NWG Member
7.	Dr. V.P. Malviya, Mineralogist, GSI, Nagpur	NWG Member
8.	Dr. Manohar Arora, Scientist , NIH, Roorkee, presented the team work of NIH on behalf of Dr. Rakesh Kumar, NWG member	Special Invitee
9.	Dr. Kalyan Rudra, West Bengal Pollution Control Board	Special Invitee
10.	Dr. Vikrant Jain, Department of Geology, Centre of Advanced Studies, University of Delhi	Special Invitee
	Ms. V. Ambili, GSI, Kerala	Special Invitee
11.	Virendra Kumar, Director, Commercial Division, GSI, N. Delhi	Organising Committee
12.	G. Dasgupta, Director and H.O, GSI, DGCO	Organising Committee
13.	Sanjiv Sharma, Director, LHIM Division, GSI, N. Delhi	Organising Committee
14.	S.K. Bohra Suptg. Geologist, Advanced Spatial Data System, GSI, N.Delhi	Organising Committee
15.	Koshy John, Suptg. Geologist, Quality Management Cell, GSI, N.Delhi	Organising Committee
16.	M.A. Karim, Suptg. Geologist, International Cooperation Div., GSI, N.Delhi	Organising Committee
17.	M.C. Upadhyay, Suptg. Geologist, Geoscience Partnership Div., GSI, N.Delhi	Organising Committee
18.	Dr. Ashutosh Joshi Suptg. Geologist, Science Policy & Coord. Div., GSI, N.Delhi	Organising Committee
19.	Shri. Prasanta Mishra, Suptg. Geologist, EPE Division, GSI, N. Delhi	Organising Committee
20.	Rakesh Kumar, Sr. Geologist, GSI, N.Delhi	Organising Committee
21.	Gautam Saha, Sr. Geologist, GSI, N.Delhi	Organising Committee
22.	Pushp Lata, Sr. Geologist GSI, N.Delhi	Organising Committee
23.	S.N.Bhagat, Sr. Geol, GSI, N.Delhi	Organising Committee
24.	Prem Prakash, Sr. Geologist, GSI, N.Delhi	Organising Committee
25.	D. Rout, Sr. Geologist, GSI, N.Delhi	Organising Committee

IGCP 582 2nd NWG meeting photographs

Dr. V. P Mishra, Chairman IGCP 582 presiding over the second NWG meeting.

Release of the publication on contribution of the NWG members for 2nd NWG meeting.

Presentations by special invitee

Presentations by NWG member