



*COP26 and the Brahmaputra –  
A New Perspective Based on the  
Underwater Domain Awareness (UDA)  
Framework – 03/06*

WEBINAR

REPORT

05 March 2022 | 1600hrs







***COP26 and the Brahmaputra –  
A New Perspective Based on the  
Underwater Domain Awareness (UDA)  
Framework – 03/06***

WEBINAR

REPORT

05 March 2022 | 1600hrs



## Table of Contents

Sr no.	Topic	Page No.
1	<b>Covering Note</b>	3
2	<b>Report on Outcomes of the High Level Dialogue: COP26 and the Brahmaputra – A New Perspective Based on the Underwater Domain Awareness (UDA) Framework 03/06</b>	4
3	<b>Underwater Domain Awareness (UDA) Framework</b>	7
4	<b>Centre of Excellence on Underwater Domain Awareness (UDA) Framework</b>	9
5	<b>Substantive Comments by the Esteemed Speakers</b>	11
6	<b>Concept Note</b>	16



MRC-NDT/UDA/03

Mar 2022

## **Covering Note**

The Maritime Research Centre (MRC), Pune and M/S NirDhwani Technology Pvt Ltd, organised a webinar titled “COP26 and the Brahmaputra – A New Perspective Based on the Underwater Domain Awareness (UDA) Framework – 03/06”, on 05 Mar 2022, for the policy makers, scientific community, executives from the stakeholders and also students & faculty from the Academia. It is the third of the series of six webinars.

The webinar was a high level dialogue among the senior strategists and experts from the industry, security establishments, diplomatic community, policy makers and others to evolve a common strategy at the national and regional level. The panel members were unanimous in endorsing the relevance and the urgency of the UDA framework for effective governance in the Brahmaputra River Basin. The panel members included:

- (a) Shri P V Sumant IPS (Retd), Former Director General of Police, Assam.
- (b) Dr. D V Thareja, Former Chief Engineer Central Water Commission.
- (c) Shri Ashok Kumar Kharya, Chief Engineer National Water Academy.
- (d) Dr. Fawzia Tarannum, Asst Prof, TERI School of Advanced Studies.
- (e) Shri Sanjay Gupta, Director Centre for Water, Rishihood University.
- (f) Dr. Douglas Hill, Associate Professor, University of Otago, Dunedin, New Zealand.
- (g) Cdr Mahendra Kumar, Hydrography Chief IWAI Noida.
- (h) Dr(Cdr) Arnab Das, Founder & Director MRC, Pune

A report has been prepared to summarize the deliberations during the webinar and to give a broad way forward for actionable inputs for the various agencies and organizations both in the government and private sector. The detailed concept note has been attached. The substantive comments made by the esteemed panel members has also been summarized as part of this document. The video recording of the three hour high level dialogue is available at <https://youtu.be/cQ6U2d3o0d0>

Dr (Cdr) Arnab Das  
Founder & Director  
Maritime Research Centre,  
Pune



## **Report on Outcomes of the High Level Dialogue: COP26 and the Brahmaputra – A New Perspective Based on the Underwater Domain Awareness (UDA) Framework – 03/06**

A webinar on the topic “COP26 and the Brahmaputra – A New Perspective Based on the Underwater Domain Awareness (UDA) Framework – 03/06” was held on the 05 Mar 2022 at 1600 hrs online, organized by the Maritime Research Centre (MRC), Pune and M/S NirDhwani Technology Pvt Ltd (NDT). The webinar was structured to discuss multiple dimensions of the issue with participants from several key areas like the policy makers, security agencies, blue industry, scientific community, diplomacy, and associated entities. The detailed concept note for the event and the list of panel members have been attached along with a brief on the substantive points made by the esteemed speakers.

The MRC, Pune was established as a technology based Think Tank to contribute to a national discourse and policy advocacy on Underwater Domain Awareness (UDA) in the Indian maritime zones, including internal waters, territorial waters, and the vast Exclusive Economic Zone (EEZ), the last extending over 23 lakh square kilometres. This contribution covers the entire spectrum of issues covering strategy, technology and innovation, and human resource development. The MRC seeks to complement the ongoing efforts to realise the vision of the Hon’ble Prime Minister of ensuring Security And Growth for All in the Region (SAGAR) in the Indian Ocean Region (IOR). The NDT is a start-up with niche R&D based capabilities in underwater acoustic hardware & software to enhance UDA capabilities. NDT is backed by researchers for high-end research based algorithms development & hardware configuration along with former naval colleagues to undertake field deployments.

The Indian Ocean Region (IOR) has attained significant strategic relevance in the 21st century. The strategic importance is related to maritime activities on all fronts and there is substantial interest among the nations within the region and outside to maintain their strategic maritime presence. The IOR, hosting important Sea Lanes of Communication (SLOCs) and massive undersea resources remains extremely critical for Blue Economic growth. However, the volatile regional geopolitical fluidity makes it a fertile ground for extra-regional powers to meddle with the domestic politics of the nations in the region. Consequently, the regional cooperation and the maritime governance have emerged as a major cause of concern. A detailed version of a holistic UDA framework as proposed by MRC, Pune is attached at enclosure-1. The socio-economic status of nations in the region requires a massive push towards economic growth even as the geopolitical and geo-strategic situation demands a nuanced approach. The safe, secure and sustainable growth model requires a comprehensive strategic vision with nations in the region coming together to pursue an effective roadmap on the way forward. The SAGAR vision is for

IOR security and development being primarily the task of the littoral states whilst extra-regional users of these waters adhere to the well-known principles of international law and conduct: any other approach is fraught with high prospects of military confrontation and regional instability. The maligned non-state actors are boldly having a free run, fuelling piracy and terrorism finding encouragement from certain internationally well-known quarters. Brahmaputra River Basin (BRB) governance has been a major cause of concern. Strategic cooperation with a binding framework is inescapable.

The **UDA framework** proposed by the MRC has significant merit in ensuring effective maritime governance in the IOR and beyond. The deliberations through the webinar recognized the relevance of the UDA framework and proposed setting up of a Centre of Excellence on the UDA Framework. The specific way forward collectively envisioned by the distinguished speakers and the participants are as follows:

(a) The importance of the river basin in ensuring sustainable growth across the stakeholders needs to be recognized and prioritized. Environmental Impact Assessment (EIA) has to be undertaken more comprehensively.

(b) Role of think tanks with deeper understanding of science & technology aspects in policy formulation was acknowledged. Closer interaction between the government and entities like MRC was encouraged. Sensitising our law makers both at the centre and the states needs to be taken up on priority.

(c) Setting up of a **Centre of Excellence** (COE) for progressing the UDA framework for effective maritime governance was unanimously endorsed. More details on the COE is attached at enclosure-2.

(d) The panellists also approved a three tier strategy of **outreach, engage and sustain**. The details are mentioned below:

**Outreach** The stakeholders across the stakeholders within and the nations in the region need to be made aware of the specific takeaways of the UDA framework through workshops & seminars, academic & corporate exchanges, short courses and bilateral & multilateral interactions. This kind of activities will facilitate heightened diplomatic outreach for India in the region.

**Engage** Post the outreach, we need to engage with these stakeholders and the nations for more involved capacity and capability building across multiple stakeholders. This will include UDA fellowships, academic degree programs in our institutes for their students & young professionals and joint projects under bilateral & multilateral MoUs. This will give us deeper penetration into their governance mechanisms.

**Sustain** The deeper penetration needs to be sustained with regional regulatory framework, establishment of a Centre of Excellence and inclusion of the UDA framework as an agenda point in the regional and global forums like IORA, BIMSTEC, IONS, Indian Ocean Commission, G-20, G-07 and more.

The three tier strategy will require massive capacity and capability building at the national level first. This can be achieved with a dedicated national capacity & capability building program, backed by the NITI Aayog. A User-Academia-Industry partnership with participation of all the stakeholders is required on priority.

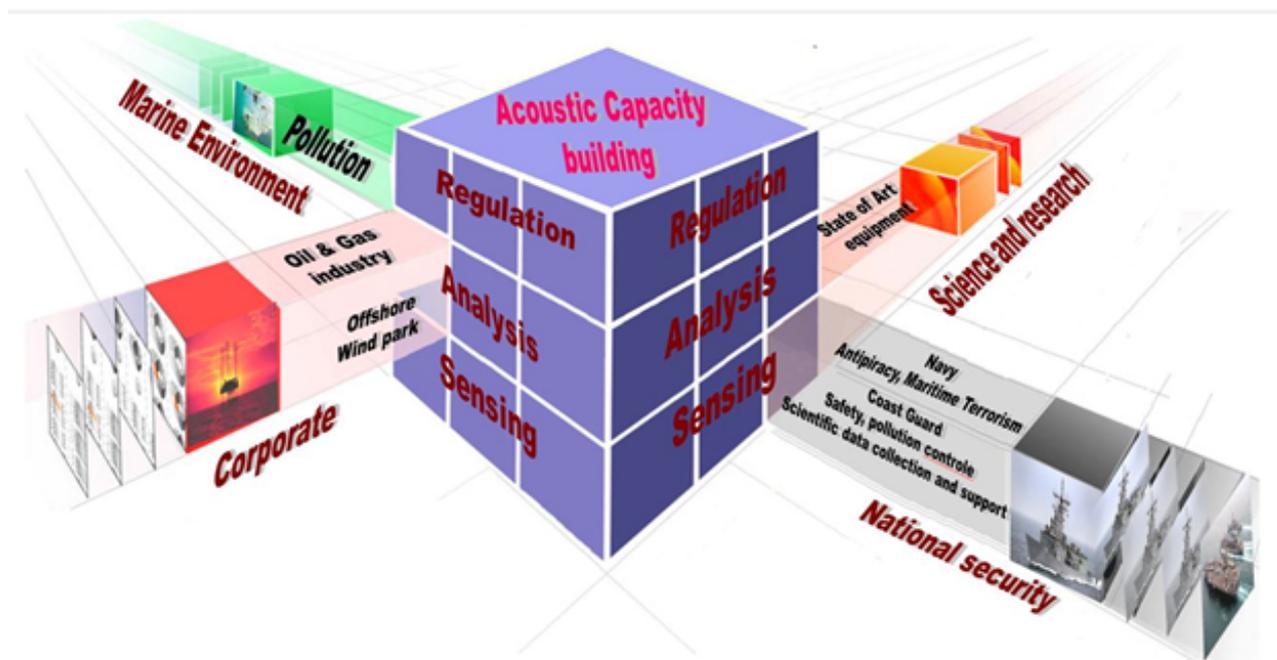
There is significant merit in taking forward the above way ahead and the Maritime Research Centre (MRC), in partnership with M/S NirDhwani Technology Pvt Ltd (NDT) is well equipped to play a leading role in progressing the UDA framework for effective maritime governance in the IOR and beyond for true realization of the SAGAR vision. MRC will be keen to engage with the key authorities and institutions to take forward the policy advocacy, development of technology & innovation and comprehensive capacity & capability building. The MRC website (<https://mrc.foundationforuda.in/>) has more details on the projects being undertaken by them along with the engagements undertaken in the last four years since its inception.



**Enclosure-1**

**Underwater Domain Awareness (UDA) Framework**

The concept of Underwater Domain Awareness (UDA) in a more specific sense will translate to our eagerness to know what is happening in the undersea realm of our maritime areas. This keenness for undersea awareness from the security perspective, means defending our Sea Lines of Communication (SLOC), coastal waters and varied maritime assets against the proliferation of submarines and mine capabilities intended to limit the access to the seas and littoral waters. However, just the military requirement may not be the only motivation to generate undersea domain awareness. The earth's undersea geophysical activities have a lot of relevance to the wellbeing of the human kind and monitoring of such activities could provide vital clues to minimize the impact of devastating natural calamities. The commercial activities in the undersea realm need precise inputs on the availability of resources to be able to effectively and efficiently explore and exploit them for economic gains. The regulators on the other hand need to know the pattern of exploitation to manage a sustainable plan. With so much of activities, commercial and military, there is significant impact on the environment. Any conservation initiative needs to precisely estimate the habitat degradation and species vulnerability caused by these activities and assess the ecosystem status. The scientific and the research community need to engage and continuously update our knowledge and access of the multiple aspects of the undersea domain. Fig. 1, presents a comprehensive perspective of the UDA. The underlying requirement for all the stakeholders is to know the developments in the undersea domain, make sense out of these developments and then respond effectively and efficiently to them before they take shape of an event.



**Fig. 1 Comprehensive Perspective of Undersea Domain Awareness**

The UDA on a comprehensive scale needs to be understood in its horizontal and vertical construct. The horizontal construct would be the resource availability in terms of technology, infrastructure, capability and capacity specific to the stakeholders or otherwise. The stakeholders represented by the four faces of the cube will have their specific requirements, however the core will remain the acoustic capacity and capability. The vertical construct is the hierarchy of establishing a comprehensive UDA. The first level or the ground level would be the sensing of the undersea domain for threats, resources and activities. The second level would be making sense of the data generated to plan security strategies, conservation plans and resource utilization plans. The next level would be to formulate and monitor regulatory framework at the local, national and global level.

The figure above gives a comprehensive way forward for the stakeholders to engage and interact. The individual cubes represent specific aspects that need to be addressed. The User-Academia-Industry partnership can be seamlessly formulated based on the user requirement, academic inputs and the industry interface represented by the specific cube. It will enable more focused approach and well defined interactive framework. Given the appropriate impetus, the UDA framework can address multiple challenges being faced by the nation today. Meaningful engagement of Young India for Nation Building, probably is the most critical aspect that deserves attention. Multi-disciplinary and multi-functional entities can interact and contribute to seamlessly synergize their efforts towards a larger goal.

The UDA Framework as proposed above has been formulated jointly by the Maritime Research Centre (MRC), Pune and M/S NirDhwani Technology Pvt Ltd (NDT). The focus is on all the three aspects namely Policy, Technology & Innovation and Human Resource Development. More details are available in the MRC website <https://mrc.foundationforuda.in/>

**Enclosure-2**

**Centre of Excellence on  
Underwater Domain Awareness (UDA) Framework**

This proposal includes the establishment of a “**Centre of Excellence**” comprising 5 sub-centres (or verticals), under the MRC, which would be characterised by a strong coherence but with independent activities. This Centre will advance the capacity and capability building objectives outlined at para (I) above. All the five centres will draw inputs from each other but have their unique and well defines Key Result Areas (KRAs) and Key Performance Areas (KPAs). The five sub-centres under the Centre of Excellence are listed below:

(a) The first will be **strategy centre** that will keep track of the R&D and industry requirements to build effective policy frameworks. There will be data driven policy formulation to address the stakeholder requirements. The KRA for the strategy centre will be to identify gaps in the domestic and regional policies and formulate effective way forward to build regional cooperation and effective maritime governance. The KPAs will reflect in seamless diplomatic interactions in the IOR and the wider Indo-Pacific region. India’s leadership in the regional forums like IORA, BIMSTEC, G-20, G-07 and the Indo-Pacific Oceans Initiative will be key indicator of our success.

(b) The second will be a multi-disciplinary **research centre** that will provide cutting edge inputs with site specific field experimental R&D to address the core acoustic capacity and capability building requirements. The IOR with its unique tropical littoral waters needs sustained indigenous R&D efforts to overcome the challenges and capitalize on the opportunities. These efforts should be able to provide nuanced inputs for the strategy centre for effective policy formulation with data driven real time ground understanding. This should minimise the dependence on the technology imports and also enhance our strategic capabilities. Home grown science & technology dominance will minimize strategic risks for security and other critical projects. The activities of this sub-centre would be of relevance to our maritime outlook in its widest scope.

(c) The third will be an **incubation centre** that will map the research outcomes of the research centre to application specific requirements of the stakeholders. Start-ups and industries can draw ideas from here and build business plans. India’s self-reliance on critical strategic issues will be critically depend on this initiative. The start-ups are always known for their agility to build high-tech solutions and the UDA framework has unimaginable possibilities. The effective eco-system provided by this incubation centre will nurture the talent pool we have in the country and provide innovative directions to channelize their efforts towards nation building.

(d) The fourth will be a **training centre** that will ensure the professionals and practitioners from the stakeholders, including partner countries to understand the nuances of the UDA framework and apply them effectively in their operations and strategic planning. This will not only make our practitioners more scientific and effective in their routine operations but also promote building the national infrastructure and bring seamless collaboration across the stakeholders. This facility will add to our diplomatic leverage in the pursuit of our larger maritime objectives.

(e) The fifth will be the **academic centre** that will build academic programs along with project based learning to prepare the next generation of students and professions to attain higher professional qualifications to appropriately take forward the UDA framework. The professional enhancement will be a very critical aspect to bring regional cooperation. The young generation and the experienced professionals sitting together and working on regional issues need no elaboration for its impact on regional cooperation. These centres will be the hotbed of innovations and ideas for effective progress and seamless interactions at all levels of decision making.

## **Substantive Comments by the Esteemed Speakers**



**Shri P V Sumant IPS (Retd)**  
**Former Director-General of**  
**Police Assam**

Shri Sumant on greeting in the webinar expressed his professional experiences while mentioning the Brahmaputra with its alongside boundaries, stating how important river waterway is and how it was used to carry troops and merchandise in the earlier days. Further, he spoke about the geopolitical development emphasising the earthquake respectively, and how it changed the path of navigation in the river from crisscross to linear which indeed has become time-consuming.

Moving ahead he also gave an insight into how the big rivers and their tributaries add up to rising the river bed which is a concern on the river becoming shallow, in addition to the fact that these flooding waters are causing land erosion. Further, he spoke about the fish life agreeing with Dr Das about the endangered species of river dolphins.

He also empathised with the challenges of river siltation, polishing, and the opening of river channels. In conclusion, he advised the Maritime Research Centre (MRC) to devise ways from technology to be helpful in future for ensuring safe and sustainable development in the waterways



**Dr D V Thareja**  
**Former Chief Engineer**  
**Central Water**  
**Commission.**

Dr Thareja was delighted to participate in such interactive webinars, continuing further he mentioned the endless opportunities and challenges of the Brahmaputra quoting that - "Dams are one of those ways to give you opportunities for natural water resource location".

He then graphically represented the zones of the Brahmaputra for the dam water storage. He spoke about availing various opportunities - which are linked with need and time further overlapping with the challenges linked to time."Mighty river requires mega level requirements, challenges along with mega statistics" -he stated further.

He also shared calculated statics of electrical energy derived from water storage potential which was proposed after a dam built on the tributary of the Brahmaputra, along with this he also gave a diagrammatic overview of the river and its flow in the dam water storage along with an overview on sediment management.

In conclusion, he shared his vast research on the challenges & opportunities of the big dam which shall drive our future working progress.



**Shri Ashok Kumar Kharya**  
**Chief Engineer**  
**National Water Academy**

Shri Kharya shared his presentation on the Brahmaputra river basin along with the tabular representation of water catchment areas in various states of India. He notably spoke about the challenge of water utilisation along with hydropower potential which needs future enhancements.

He also spoke about the climate vulnerability and sensitivity coming along this region, "slighter change in the different parameters shall make larger changes in hydrological scenario", he said.

He Further insisted upon the need for training and capacity building to be sorted with the technological enhancements. In conclusion, he quickly briefed on the National Water Academy (NWA) and how it can help in the domain.



**Dr Fawzia Tarannum**  
**Asst Prof,**  
**TERI School of**  
**Advanced Studies.**

Dr Fawzia in her presentation covered a huge understanding of water governance and its challenges in the Brahmaputra. She explicitly explained the subtle difference between governance and management. Further, the slides presented broad challenges such as - water allocation, water conflict relating to institutions. Speaking about the multilateral and bilateral administrative boundaries she further presented a list of challenges-different riparian country issues along with interstate, intrastate, transboundary and intersectoral levels.

She also briefed her view of the polycentric environment governance. Then she gave a little mention about our MOUs with nearby countries of India. Moving further with the next challenge named 'Reductionist challenge'. She also stated that "We should not look at the river in isolation but we should look at it as a social-ecological system". Moving ahead with the next challenge of hydro hegemony and hydro bureaucracy which needs a very comprehensive approach, she stated along with Climate change also being another challenge faced by the globe.

Lastly, she spoke about gender and equity issues in the water sector and suggested some frameworks that shall help overcome the challenges mentioned above.

On a concluding note, she emphasised different approaches towards governance, transboundary cooperation, financials, peace and political stability.

## **Remarks by Special Invitees**



**Shri Sanjay Gupta**  
Director Centre for  
Water,  
Rishihood University

Shri Sanjay started with a concern about the absence of water awareness among the citizens across India. He mentioned India's expertise to overcome this concern regarding the water sector. a welcoming approach for young students across India to see water management as their career with an organised format.

He recommended that people should work in the alliance without which the same work duplicates in itself with unsolved contradictions. In concern to the rivers in India, he also mentioned a course - 'Alliance for rivers in India'- he introduced.



**Dr Douglas Hill**  
Associate Professor, School  
for Geography, University of  
Otego, Dunedin, New Zealand.

Dr Hill was thankful to intervene with the above speakers along with their apprehensive approach towards the challenges in flood management, significant institutional issues. He appreciated the robust and transparent data for the students to learn how sub-basins and transboundary based models to study these kinds of systems. Followed by some questions from the speakers.



**Cdr Mahendra Kumar**  
Hydrography Chief  
IWAI Noida

Cdr Kumar praised the speakers for their perspectives on different aspects of river and river work. Emphasising the UDA framework, especially in the Brahmaputra. People associated with the river need tools, technology, and economy along with the conversation of nature. Then talking about the UDA framework he mentioned the composite engines in the shipyards which shall help in the acoustic environment.

Virtual navigation range shall help in navigating the river alongside. Also, the technology should help the people around to build their economy along the river. Concluding on the recommendation that the inland waterways shall undertake in near future.

## **Remarks by Hosts**



**Dr. (Cdr) Arnab Das**  
**Founder & Director, MRC ,**  
**Pune**

Dr Das thanked with gratitude for a good opening remark deliberated on various issues of the Brahmaputra, moving further with underwater domain awareness (UDA) framework presentation which pertains to the freshwater systems mentioning about the Brahmaputra and its diverse characteristics - Emphasising comprehensively towards UDA framework and its connectivity with people, economy and nature in terms of policy interventions or technology interventions. The acoustic vision involves a lot of science and technology.

Further, he added, projects undertaken by MRC that display the potential of the UDA Framework, Dr Das emphasised the numerous applications of the UDA Framework across the maritime domain.

He concluded by suggesting the following way ahead:

- a) The UDA framework should be accorded national priority; MRC is well placed to play a major role as a think tank for technology-driven policy advocacy. Policymakers in the coastal states need to be apprised of the UDA framework and its nuances.
- b) A Centre of Excellence may be set up for effective realisation of the UDA framework with a specific focus on research, academic programs, skill development, innovation, and policy formulation.
- c) A three-tier strategy of outreach, engagement, and sustain may be taken on priority to drive the UDA framework for the effective realisation of the SAGAR vision. The UDA framework should be included in forums like IORA, BIMSTEC, G-20, G-07, Indian Ocean Commission, and others.



**Ms. Ananya Malik**  
**MRC RA (Brahmaputra)**

Expressing her gratitude for this opportunity she thanked all the dignitaries on behalf of the maritime research centre, extending a warm welcome to the people in the webinar and complementing the speakers for their thought-provoking, enlightening, and insightful discussion along with their shared views and expertise on this domain. She pointed out that this framework is fairly new and it's very motivating seeing so many experts coming together to discuss and work on it. Concluding she wished everyone good health amidst this pandemic.



**Enclosure-3**

**Concept Note**

The river Brahmaputra has played a critical role in shaping the culture, heritage and economy of Assam. There is potential for more and it is essential that we build capabilities and capacities for a safe, secure and sustainable growth of the region with optimum utilization of the resources in the river.

- The 'safe' addresses the disaster management efforts originating from the river – it could mean prevention and post event rehabilitation.
- The 'secure' address the security concerns that may originate from the river or even endanger assets in the river. The volatile security situation in the region does demand fresh initiatives that are able to address the concerns.
- The 'sustainable growth' pertains to economic growth with minimal degradation to the river flora and fauna.

The river ecosystem particularly in the tropical regions represents significant biodiversity with rich source of food and other resources. The sustainable growth model will require substantial efforts in ensuring minimal degradation of the river ecosystem. The river species including the river dolphins use sound or acoustic signals for multiple biologically critical functions like communication, navigation, foraging, breeding, etc. Thus, the acoustic habitat plays a critical role in their wellbeing and population abundance. There are innumerable dimensions of human interaction with these freshwater bodies. The growing human interventions can limit our usage of this critical resource and make us extremely vulnerable. The usage apart from domestic consumption can range from navigable waters for river transport, hydropower generation, exploitation of the living & non-living resources, climate control, wellbeing of the local flora & fauna, disaster management and more. The river provides a vital source of livelihood and economic prosperity to the region and also poses a great challenge to human life, flora & fauna, due to floods and erosion disasters. At present, the consumptive use of the river waters is at a minimum stage. However, the annual yield of the basin forms almost 30% of the annual water resources of the country. Thereby the basin has a great importance in supporting the water & energy security of the country.

The COP26 dialogues have brought out the critical role of the renewable energy sources in mitigating the climate change by substitution of fossil fuels for energy generation. Brahmaputra basin is the single greatest source of renewable energy to the extent of 40,000 MW and the same forms a very vital part of INDC goals committed by the nation to the world. Impacts on these resources also needs to be carefully evaluated and provided for. Moreover, Bangladesh is also critically short of renewable energy sources and will have to be supported by India for their wellbeing. Brahmaputra developments are important in this regard also. The Underwater Domain Awareness (UDA) is extremely critical for effective governance at all levels. There are multiple mega initiatives from the Government of India (GoI) today to enhance our growth and prosperity, however the sustainability remains a concern. A high-technology infrastructure needs to be put in place that can monitor the entire situation in real-time and provide the decision makers actionable

inputs on a tactical and strategic level. Right from the policy & technology interventions as well as capacity & capability building to manage such a high-technology systems will require substantial understanding and strategic vision. Organizational structure and interaction among the government and private players need to be planned to facilitate effective governance mechanism. Pooling of resources and synergizing of efforts across stakeholders, with high deployment of Science & Technology (S&T) tools, is the key to success. The COP26 summit has once again drawn attention of the entire global community to sustainable growth models and the climate change concerns. The Brahmaputra with its unique characteristics is a good case study to build on such sustainable development models.

### **Proposal**

The state of Assam is extremely blessed in terms of the mighty river Brahmaputra flowing from one end to the other with over 900 kms of river length across the state. The resource availability is unprecedented, however the challenges of water resource management also has its own dimensions and dynamics.

The MRC and M/S NirDhwani Technology Pvt Ltd (NDT), organized a webinar on **05 Mar 2022 at 1600 hrs**. The title of the seminar was **“COP26 and the Brahmaputra: A New Perspective Based on the Underwater Domain Awareness (UDA) Framework”**. The seminar brought all the stakeholders together focusing on the UDA framework on multiple aspects of the water resource management issue. A detailed seminar was formalized and forwarded to the policymakers, stakeholders and practitioners for a nuanced way ahead.

### **Program**

- 1600 hrs- Opening Address by Shri P V Sumant IPS (Retd),  
Former Director General of Police, Assam.
- 1615 hrs- Introductory Remarks on the UDA Framework and the River Systems.  
Dr(Cdr) Arnab Das, Founder & Director MRC, Pune.
- 1630 hrs- Challenges & Opportunities of Big Dam: Past, Present & Future  
Dr. D V Thareja, Former Chief Engineer Central Water Commission.
- 1700 hrs- Capacity & Capability Building Challenges.  
Shri Ashok Kumar Kharya, Chief Engineer National Water Academy.
- 1715 hrs- Water Governance Challenges on the Brahmaputra.  
Dr. Fawzia Tarannum, Asst Prof, TERI School of Advanced Studies.
- 1730 hrs- Special Interventions:  
Shri Sanjay Gupta, Director Centre for Water, Rishihood University.  
Dr. Douglas Hill, Associate Professor, school for Geography,  
University of Otego, Dunedin, New Zealand.  
Cdr Mahendra Kumar, Hydrography Chief IWAI Noida.
- 1825 hrs- Vote of Thanks by Ms. Ananya Malik, MRC RA (Brahmaputra).

### **Convenor**

Dr.(Cdr) Arnab Das, Founder & Director MRC, Pune.  
Mobile-9665033463, Email-director.mrc@foundationforuda.in



# COP26 and the Brahmaputra - A New Perspective Based on the Underwater Domain Awareness (UDA) Framework - 03/06

## ESTEEMED GUESTS



**SHRI P V SUMANT IPS (RETD)**  
Former Director Central  
of Police, Assam.



**DR. D V THAREJA**  
Former Chief Engineer  
Central Water  
Commission



**SHRI ASHOK KUMAR KHARYA**  
Chief Engineer  
National Water Academy.



**DR. FAWZIA TARANNUM**  
Asst Prof, TERI School of  
Advanced Studies.

## SPECIAL INVITEES



**SHRI SANJAY GUPTA**  
Director  
Centre for Water,  
Rishihood University.



**DR. DOUGLAS HILL**  
Associate Professor,  
school for Geography,  
University of Otago,  
Dunedin, New Zealand.



**CDR MAHENDRA KUMAR**  
Hydrography Chief  
IWAI Noida.

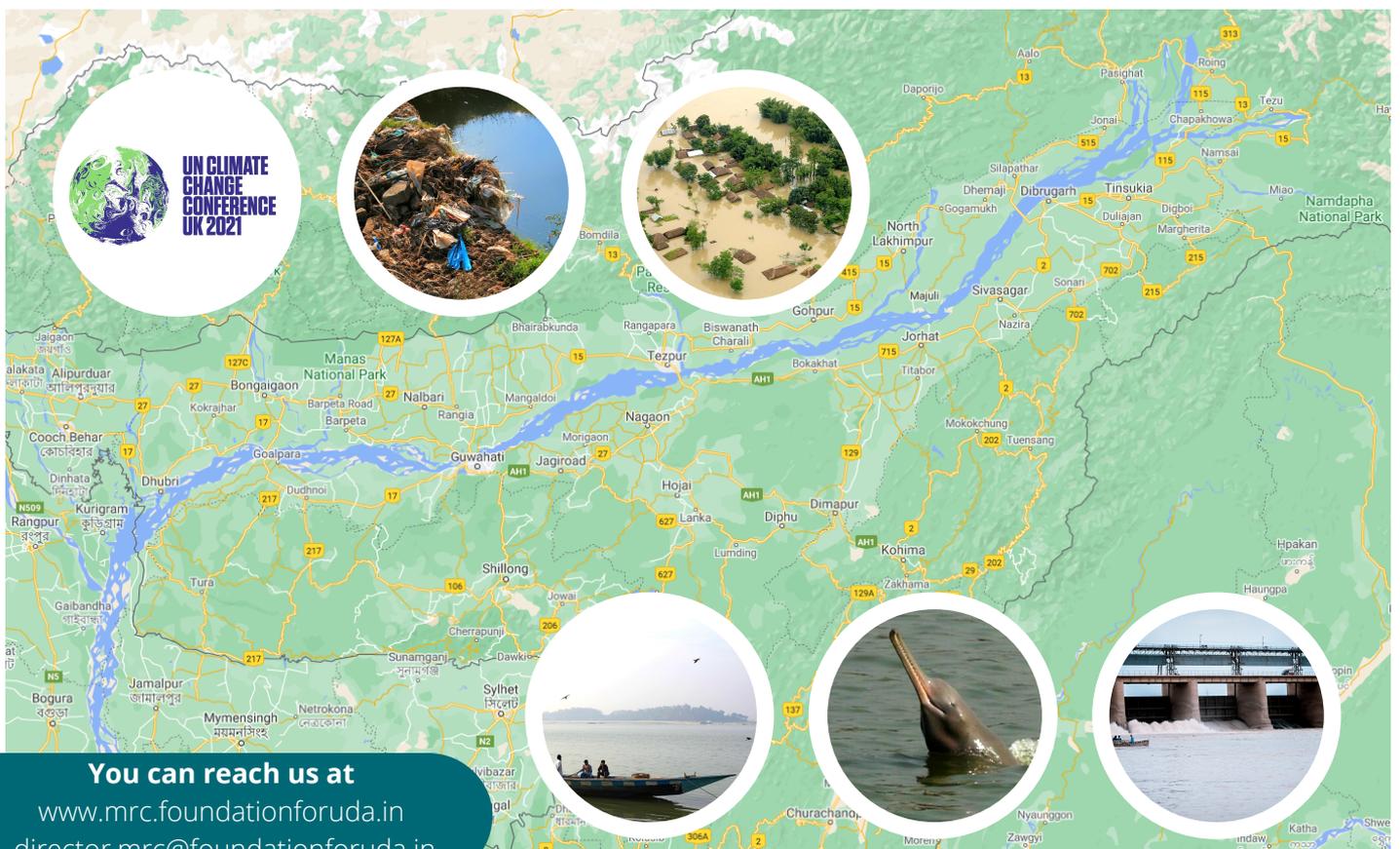


**DR (CDR) ARNAB DAS**  
Founder & Director  
MRC, Pune



**MS ANANYA MALIK**  
MRC Research Associate  
(Brahmaputra).

## HOSTS



**You can reach us at**  
[www.mrc.foundationforuda.in](http://www.mrc.foundationforuda.in)  
[director.mrc@foundationforuda.in](mailto:director.mrc@foundationforuda.in)