



Underwater Domain Awareness for Ocean

WEBINAR

REPORT

08 June 2023 | 1100hrs

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Table of Contents

Sr no.	Topic	Page No.
1	Executive Summary	3
2	Participation	4
3	Outcomes	7
4	Enclosures	9
	1. Enclosure 1 – UDA Framework	
	2. Enclosure 2 – Webinar Structure	
	3. Enclosure 3 – Concluding Remarks by Amb Anup Mudgal	
	4. Enclosure 4 – Glimpse from the Webinar	

Executive Summary

The World Ocean Day webinar organized by MRC was a significant event aimed at highlighting the importance of the ocean and fostering discussions on various critical topics. The primary focus of the webinar was to raise awareness about the ocean's significance and promote sustainable practices for its conservation and management.

The ocean plays a vital role in our planet's health and well-being. It regulates the Earth's climate, produces a significant portion of the oxygen we breathe, and serves as a habitat for a diverse array of marine species. Additionally, the ocean contributes to global food security, supports various industries such as shipping and tourism, and offers immense potential for scientific research and exploration.

MRC is known for its commitment to advancing knowledge and understanding of the ocean. Through its research initiatives, MRC aims to address the challenges facing marine ecosystems, promote sustainable practices, and contribute to evidence-based decision-making for ocean management.

The webinar aimed to emphasize the value of the ocean and address several pressing issues related to its well-being. Topics covered during the presentations included multilateral-bilateral collaborations, biosphere reserves, marine spatial planning, sediment management, AIS data, AUV design and development, APY analysis, climate change, water management, urban flood management, and passive sonar simulation.

By exploring these topics, the webinar sought to educate participants about the challenges and opportunities associated with ocean conservation and management. It aimed to inspire individuals and organizations to take action in protecting the ocean's health and preserving its resources for future generations.

The MRC's dedication to the cause of ocean protection was evident throughout the event. The webinar not only provided a platform for knowledge dissemination but also served as a catalyst for dialogue and collaboration. Through engaging presentations, and interactive sessions, MRC fostered a sense of collective responsibility and inspired individuals and organizations to take concrete actions for the betterment of the ocean.

The webinar also aligned with the **SAGAR vision**, which stands for Security and Growth for All in the Region. The SAGAR vision emphasizes the need for maritime cooperation among Indian Ocean Rim countries, promoting sustainable development, enhancing maritime security, and addressing common challenges faced by the region. By fostering international collaboration and knowledge sharing, the webinar aimed to contribute to the realization of the SAGAR vision and the collective efforts in addressing ocean-related issues.

The event also sought to tackle various challenges faced by the world's oceans and promote the sustainable use and conservation of its resources, aligning with the concept of the **Blue Economy**. The Blue Economy emphasizes the sustainable development of ocean resources, balancing economic growth with environmental protection. It recognizes the importance of harnessing the ocean's potential to enhance livelihoods while ensuring the long-term health and resilience of marine ecosystems.

Overall, the MRC's role in organizing the webinar was instrumental in facilitating discussions, and disseminating crucial information. Through its commitment to research, collaboration, and advocacy, MRC continues to contribute significantly to the field of marine science and conservation, working towards a sustainable and thriving ocean ecosystem.

Background

The world's oceans are vast, covering over 70% of the Earth's surface and playing a crucial role in the overall health and functioning of our planet. They are home to a rich variety of ecosystems and support a wide range of marine species. The oceans also regulate global climate patterns, generate oxygen, and absorb a significant amount of carbon dioxide, helping to mitigate the impacts of climate change.

However, despite their immense importance, the world's oceans face numerous challenges that threaten their health and sustainability. Overfishing, habitat destruction, pollution, climate change, and unsustainable practices have led to the degradation of marine ecosystems and the loss of biodiversity. Additionally, issues such as marine pollution, including plastic waste and oil spills, pose significant threats to the ocean's well-being.

Recognizing the urgent need to address these challenges and promote the sustainable use and conservation of the ocean's resources, World Ocean Day is celebrated annually on June 8th. It serves as an opportunity to raise awareness about the importance of the ocean and mobilize individuals, communities, and organizations to take action towards its protection.

The webinar was organized to coincide with this global celebration and contribute to the collective efforts in addressing ocean-related issues. The MRC's commitment to promoting sustainable practices and advocating for the protection of the marine environment was reflected in the webinar's agenda.

One of the crucial aspects highlighted was the importance of **environmental monitoring**, particularly with a specific focus on climate change assessment. Understanding and mitigating the impacts of climate change on the ocean's ecosystems and coastal communities are vital for safeguarding livelihoods and promoting sustainable practices. By comprehensively assessing the effects of climate change, policymakers and stakeholders can make informed decisions that enhance resilience and adaptability in the face of evolving environmental conditions.

Furthermore, the webinar explored the role of **digital transformation** in achieving the **Sustainable Development Goals (SDGs)** in the context of ocean conservation. Digital technologies can play a vital role in improving data collection, analysis, and dissemination, facilitating informed decision-making for sustainable ocean management. These digital advancements can enable the integration of various data sources, including remote sensing, oceanographic data, and socio-economic indicators, to support evidence-based policy formulation

and efficient resource allocation.

Proposal

The Maritime Research Centre (MRC) is proposing to organize a webinar in celebration of World Ocean Day with the aim of raising awareness about the importance of the ocean and fostering discussions on key issues related to its conservation. The proposed webinar will serve as a platform for knowledge sharing, collaboration, and the promotion of sustainable practices to safeguard the health and well-being of our oceans.

The primary objective of the World Ocean Day webinar is to raise awareness about the significance of the ocean and its ecosystems. By hosting informative presentations and interactive sessions, the webinar will educate participants about the challenges facing our oceans and the urgency of taking action to protect them.

Moreover, the webinar will proudly showcase MRC's ongoing research and innovation initiatives, exemplifying its commitment to advancing underwater domain awareness and promoting sustainable practices. By sharing practical examples, and best practices, MRC seeks to inspire individuals, organizations, and communities to adopt responsible stewardship and actively contribute to the sustainable use and conservation of marine resources.

Collaboration and cooperation among stakeholders are vital for effective ocean conservation. The webinar will facilitate discussions and networking opportunities, bringing together researchers, policymakers, industry professionals, and the public. Through shared experiences, perspectives, and expertise, the webinar seeks to foster collaboration and the exchange of ideas and solutions, with the ultimate goal of developing joint initiatives and partnerships to address ocean-related challenges.

The impact of the MRC's World Ocean Day webinar will extend far beyond the event itself. MRC is committed to leveraging the knowledge shared and partnerships forged during the webinar to drive collective action and ensure the long-term health and resilience of our oceans. By raising awareness, promoting sustainable practices, and fostering collaboration, MRC aims to inspire lasting change in the way individuals, communities, and organizations interact with the ocean, becoming steadfast stewards of this invaluable resource.

MRC's recent webinar successfully brought together experts from the policy and technology fields, fostering an invaluable exchange of knowledge and insights on the crucial topic of marine resource management. By gathering policymakers and technology specialists in the same forum, the event created a unique platform for cross-sector collaboration and dialogue. Participants engaged in fruitful discussions, exploring innovative approaches and solutions to address the challenges associated with the sustainable utilization and conservation of marine resources. The webinar facilitated a deeper understanding of the complex interplay between policy frameworks and technological advancements, highlighting the need for integrated strategies that harmonize environmental conservation, socioeconomic development, and technological innovation. The event not only strengthened the bonds between policy and technology experts but also paved the way for future collaborations, promoting a holistic and inclusive approach to managing our precious marine resources.

In summary, the proposed World Ocean Day [webinar](#) by the Maritime Research Centre (MRC) promises to be a standout event, highlighting the organization's leadership and commitment to advancing underwater domain awareness. With its focus on raising awareness, promoting sustainable practices, fostering collaboration, and exploring key topics in ocean conservation, the MRC's webinar will empower participants to become agents of positive change, safeguarding the ocean's health and securing its invaluable contributions for generations to come.

Participation

The participants and guests for the webinar came from diverse fields, including:

- Amb Anup k Mudgal – Blue Economy Task Force at FICCI, Chair
- Amb Rajiv Bhatia – Chair of FICCI's Task Force on Blue Economy
- Mr. Shridhar Prabhuraman – MRC Deputy Manager
- Ms. Nishtha Vishwakarma – Communication and Advocacy Lead in MRC
- J Catherine – Full Time Fellow at MRC
- Divya Rai – Handling Geopolitics and International Relation at MRC
- Khwahish Vig - Symbiosis School of Liberal Arts, Pune
- Sanskar Soni - Indian Institute of Technology, Delhi
- Aniesh Das - Pune Institute of Computer Technology (PICT), Pune
- Akshita Mangal - Indian Institute of Technology, Delhi
- Akshay Mondal - Indian Institute of Technology, Kharagpur
- Romit Kaware - Indian Institute of Technology, Delhi
- Rishika Khanna – Full Time Fellow at MRC
- Aman Bansal - Indian Institute of Technology, Roorkee
- Pratham Shedurkar - Indian Institute of Technology, Kharagpur
- Arijit Biswas - Indian Institute of Technology, Kharagpur
- Shlok Nemani - Indian Institute of Technology, Bombay
- Somya - Indian Institute of Technology, Delhi
- Kothinti Balaji - Indian Institute of Technology, Kharagpur
- Radhika Agarwal - Indian Institute of Technology, Roorkee
- Akshay Bhivagde - Indian Institute of Technology, Kharagpur
- Kethavath Naik - Indian Institute of Technology, Guwahati
- Vanshita Sharma - Indian Institute of Technology, Guwahati
- Sneha Sahu - Indian Institute of Technology, Delhi
- Chirag Khare - Indian Institute of Technology, Delhi
- Mohd Athar Ansari - Indian Institute of Technology, Kharagpur
- Meenatchi G - Indian Institute of Technology, Guwahati
- Rishikesh Nanaware - Indian Institute of Technology, Delhi

Outcomes

General outcome

1. The World Ocean Day webinar successfully achieved its **objectives of raising awareness**, promoting sustainable practices, fostering collaboration, and exploring key topics related to ocean conservation.
2. Through engaging presentations, and interactive sessions, the webinar inspired participants to **deepen their understanding of the importance of the ocean** and motivated them to take concrete actions towards its protection.
3. The event facilitated **knowledge sharing, networking, engaging industry professionals, and the public**, leading to increased collective efforts for a resilient and thriving marine environment.
4. The webinar's impact extended beyond the event itself, leaving a lasting impression on participants and catalyzing positive change in **ocean conservation practices and policies worldwide**.

Key Outcomes

By enabling a comprehensive understanding of the underwater environment and its activities, UDA assumes a pivotal role in the conservation and management of the ocean. It encompasses the gathering, integration, and analysis of diverse data types to attain situational awareness and deep insights into the marine domain.

Due to several crucial reasons, **UDA carries immense significance within the domain of ocean conservation and management**.

Environmental Monitoring: The webinar presentations provided ample evidence that **UDA enables the facilitation of real-time data collection on vital factors such as water quality, temperature, salinity, acidity, and biodiversity**. Through its capabilities, UDA plays a pivotal role in assessing the health of marine ecosystems, identifying potential risks, and comprehending the implications of human actions on the environment. This wealth of accurate and current information empowers scientists and policymakers to make well-informed decisions concerning conservation strategies and resource management, leading to effective measures that safeguard and sustain our invaluable marine resources.

Maritime Security: The insightful presentations by interns validate that the **incorporation of a variety of sensors and surveillance technologies strengthens maritime security through UDA systems.** These systems actively monitor and detect illicit activities such as illegal fishing, smuggling, piracy, and unauthorized vessel entry. They facilitate the identification of suspicious behavior, vessel tracking, and prompt response to mitigate security risks. This proactive approach significantly contributes to the preservation of marine resources, enforcement of regulations, and protection of vulnerable areas, ensuring the overall safeguarding of our oceans.

Disaster Response: Assuming a pivotal role in early warning systems and disaster response initiatives, UDA remains vigilant in monitoring oceanographic conditions, including water currents, wave heights, and fluctuations in sea level. **Through its capabilities, UDA ensures the timely provision of alerts and forecasts for natural calamities such as tsunamis, hurricanes, and oil spills.** This critical information empowers authorities to proactively implement precautionary measures, evacuate at-risk regions, and effectively coordinate emergency response operations, safeguarding lives and minimizing the impact of potential disasters.

Scientific Research: By granting researchers access to a vast array of data and observations from the underwater realm, UDA plays a pivotal role in facilitating scientific research. **Through UDA, scientists are empowered to delve into various aspects of study, including marine biodiversity, the tracking of marine species, the examination of climate change effects, and the exploration of oceanographic phenomena.** The invaluable knowledge derived from these investigations enhances our comprehension of the intricate marine ecosystem and guides us in making informed decisions rooted in evidence-based conservation and management practices.

Conservation Planning and Marine Spatial Management: The interns highlighted in their presentations that UDA plays a pivotal role in the development and implementation of effective conservation strategies and marine spatial management plans. By leveraging its capacity to map and understand the distribution of marine species, habitats, and ecologically significant areas, **UDA enables the identification of biodiversity hotspots, migration patterns, and critical habitats.** This knowledge holds immense value in the establishment of marine protected areas, the promotion of sustainable fishing practices, and the mitigation of adverse impacts caused by human activities on fragile ecosystems. By harnessing the capabilities offered by UDA, we can ensure the preservation and sustainable management of our invaluable marine resources for the benefit of future generations.

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 explore and exploit them for economic gains effectively and efficiently. 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.

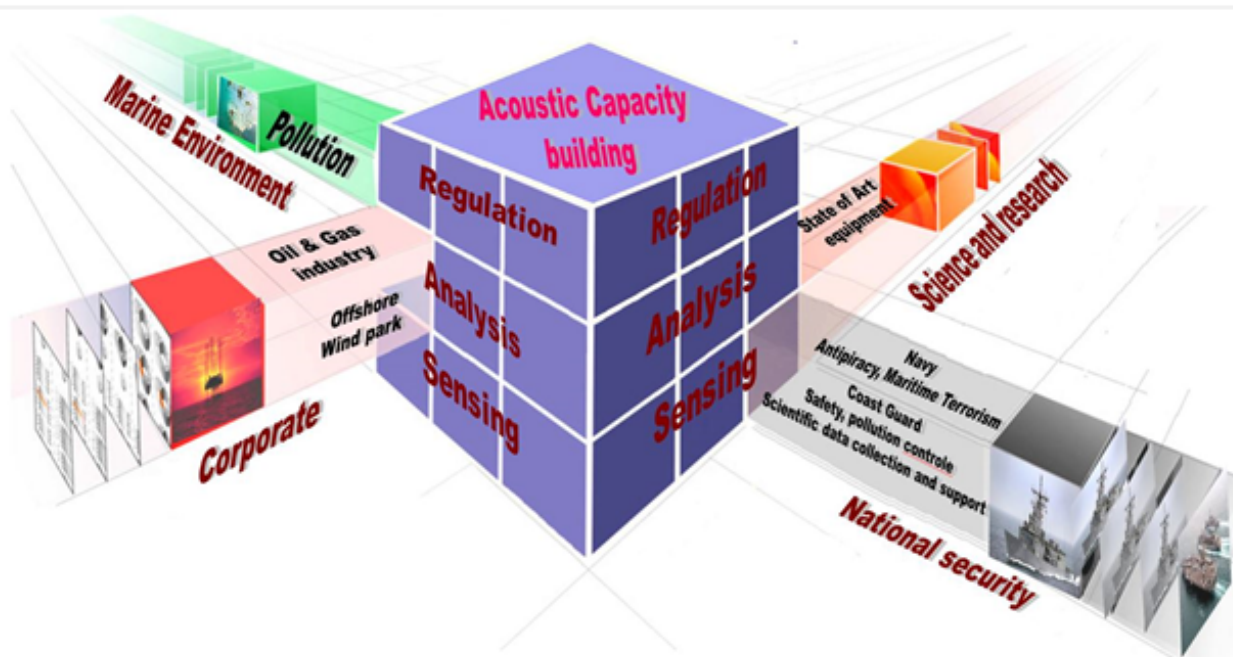


Fig. 1 Comprehensive Perspective of Undersea Domain Awareness

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

Webinar Structure

Multilateral-Bilateral Collaborations and UDA – 10 mins

- Divya Rai

Biosphere Reserves – 10 mins

- Khwahish Vig

Marine Spatial Planning – 20 mins

- Sanskar Soni & Anish Das
- Akshita Mangal
- Akshay Mondal

Sediment Management – 16 mins

Sediment Classification for National Maritime Issues

- Romit Kaware
- Sediment Transport Management
- Rishika Khanna

AIS Data – 4 mins

Collision Avoidance System

- Aman Bansal

AUV Design and Development – 8 mins

AUV Design for Climate Change

- Pratham Shedurkar

AUV Design for Deep Sea Mining

- Arijit Biswas

APY Analysis – 16 mins

APY Analysis for Shrimp Farming

- Shlok Nemani
- Somya

APY Analysis for Carp Farming

- Kothinti Balaji

Climate Change – 12 mins

Economic Impact of climate change on Seaweeds/Shrimp Farming

- Radhika Agarwal

Impact of climate change on Ocean Acidification

- Akshay Bhivagde

Climate change impact in Indian Ocean Region

- Kethavath Naik

Water Management – 16 mins

Groundwater Management in Brahmaputra Basin

- Vanshita Sharma
Impact of Water Quality change in Aquaculture
- Sneha Sahu
Multiparameter sensor based water quality monitoring
- Chirag Khare
Machine Learning Based Estimation of Nutrient Concentration of Brahmaputra Basin
- Mohd Athar Ansari

Urban Flood Management - 4 mins

- Meenatchi G

Passive Sonar Simulation Tool – 4 mins

Effective Detection Algorithm for Passive Sonar Simulator

- Rishikesh Nanaware

Indus & Brahmaputra – 8 mins

- J Catherine

Enclosure-3

Concluding Remarks by Amb Anup Mudgal



Ambassador Anup Mudgal, who is a part of the blue economy task force and has contributed significantly to the group, attended the webinar on the importance of Underwater Domain Awareness (UDA) organised by Maritime Research Center. During the webinar, several students presented their research on UDA. At the end of the presentations, Ambassador Mudgal expressed his appreciation and shared some profound message.

He emphasized the significance of understanding the spaces in which we operate, drawing a parallel between the underwater domain and our general perception of life on Earth. He highlighted the rarity and preciousness of life in the universe, stating that out of the estimated 7 trillion planets, we have yet to find any indication of life beyond our own. This remarkable coincidence should not be taken for granted.

Ambassador Mudgal explained that life on Earth exists within a narrow bandwidth of enabling factors. These factors have allowed for the convergence of conditions necessary for life to flourish. However, throughout the planet's history, there have been several mass extinctions where this convergence was disrupted, leading to the loss of numerous species. He expressed concern that human activities are now contributing to a potential next mass extinction, primarily through the damage inflicted upon the planet and the resulting global warming.

He discussed the concept of living within the capacity of the planet, both in terms of available resources and the composition of the planet itself. Just as we monitor various factors on land to avoid exceeding limits, such as temperature, rainfall, and pollution levels, we lack a similar system for the oceans. This is where UDA plays a vital role. UDA provides awareness and guidance regarding the ocean's conditions and whether we are exceeding the limits necessary for life to survive and thrive.

Ambassador Mudgal acknowledged the complexity of managing the numerous interconnected factors that affect the oceans. He expressed optimism about the potential of massive computational power, artificial intelligence, and data processing to analyze and understand these factors. By leveraging these technologies, students can contribute to ensuring that the mix of enabling factors remains within the narrow bandwidth required for life.

He urged the young participants to continue their efforts in understanding the spaces we inhabit. Without a comprehensive understanding of our environment, we risk crossing tipping points and becoming part of a mass extinction event. **Ambassador Mudgal emphasized that life is an exceptional blessing and it is crucial to be careful and considerate of the factors that created us.**

In conclusion, Ambassador Mudgal expressed his gratitude for the opportunity to listen to the exciting presentations by the students. He highlighted his work with the Association of Indian Universities in spreading the message of sustainability to educational institutions. He hoped that the presentations made by these young individuals would serve as a gateway to inspire others to appreciate the challenges we face and the importance of staying within the narrow bandwidth necessary for life to thrive.

Enclosure-4

Glimpses from the Webinar



Amb Anup k Mudgal



Dr (Cdr) Arnab Das



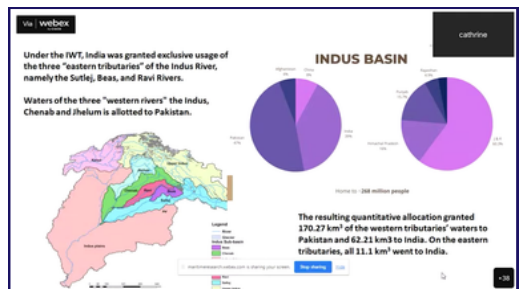
Ms. Nishtha Vishwakarma



Mr. Shridhar Prabhuraman



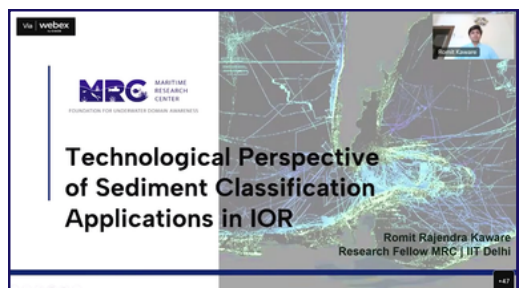
Rishika Khanna



J Catherine



Shlok Nemani



Romit Kaware

WEBINAR CELEBRATING WORLD OCEANS DAY 2023

ESTEEMED GUESTS



AMB ANUP K MUDGAL
Blue Economy Task
Force at FICCI, Chair



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

HOSTS



MR. SHRIDHAR PRABHURAMAN
MRC Deputy Director



MS. NISHTHA VISHWAKARMA
Communications and
Advocacy Lead, MRC

PRESENTATION BY MRC FELLOWS



J. CATHERINE
Full-Time
Fellow



SHLOK NEMANI
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