

End of Project Report

Highlights from the final year and key achievements

November 2020



**INDIA-UK
Water Centre**
भारत-यूके
जल केन्द्र



The India-UK Water Centre (IUKWC) promotes cooperation and collaboration between the complementary priorities of NERC-MoES water security research.

भारत-यूके जल केंद्र एम.ओ.ई.एस - एन.ई.आर.सी (यूके) जल सुरक्षा अनुसंधान की परिपूरक प्राथमिकताओं के बीच सहकार्यता और सहयोग को बढ़ावा देता है ।

CITATION

IUKWC, 2020. End of Project Report: Highlights from the final year and key achievements. Wallingford, UK, and Pune, India, 54 pp

Images from Pixabay and Emma Bennett (IUKWC)





1. Introduction

The India-UK Water Centre (IUKWC) was a virtual joint centre established in 2016 and funded by the Indian Ministry of Earth Sciences (MoES) and the UK's Natural Environment Research Council (NERC). The aim of the India-UK Water Centre was to promote cooperation and collaboration between NERC-MoES water security research in order to establish a platform for, and legacy of, long-term partnerships and dialogue between Indian and UK water researchers, water policy-makers and water businesses.

This aim was achieved by fulfilling five objectives as follows:

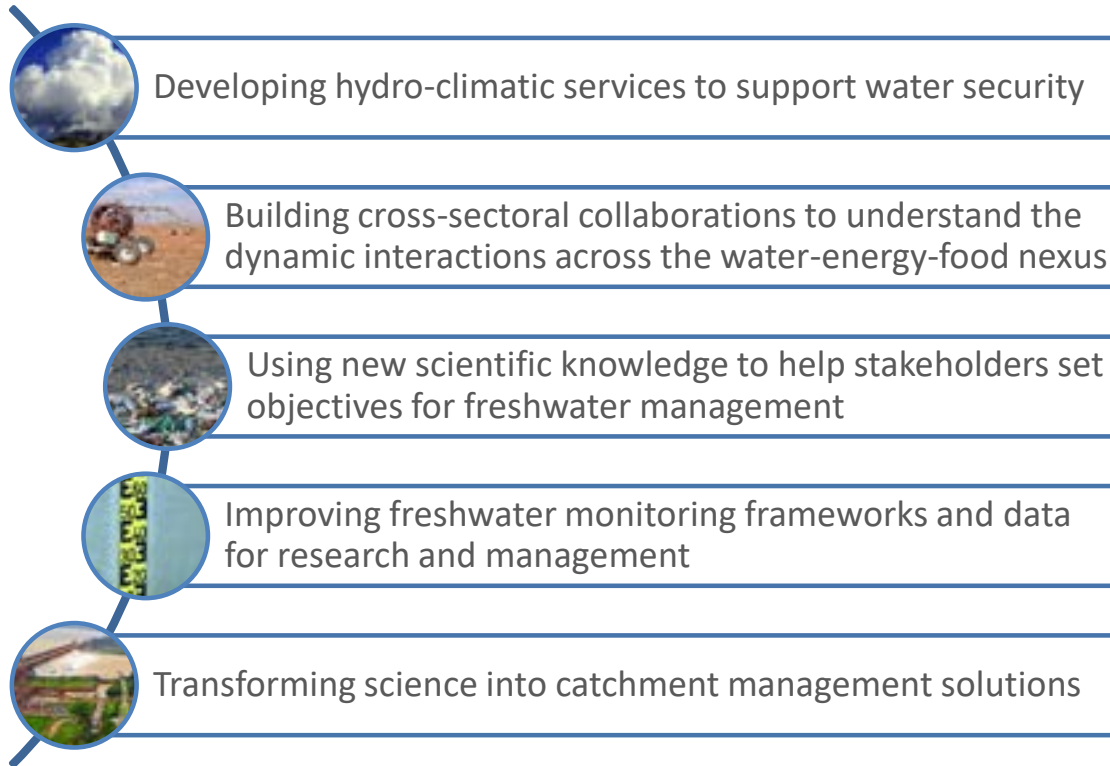
- Engaging the community;
- Facilitating partnerships and building capacity;
- Enhancing knowledge exchange;
- Supporting future India-UK collaboration; and
- Developing effective communication platforms.

These objectives, in turn, were achieved by undertaking a series of activities during the lifespan of the Centre. The activities included:

- Establishment and maintenance of an Open Network of Water Researchers, which was hosted on the IUKWC website (iukwc.org), with the aim to promote engagement;
- Facilitation of community led Science Workshops and Researcher Exchange scheme that facilitated partnerships and built capacity;
- Delivery of User Engagement Initiatives (UEIs) and Grassroots Field Exposure Sessions (GFES), which enhanced knowledge exchange between scientists, water professionals, and other stakeholders, as well as promoting co-design and co-development of new research;
- Commissioning of Pump Priming Projects (PPPs) to promote and support future India-UK collaborations; and
- Developing and maintaining efficient and varied communication methods, ranging from an active website and social media accounts, to regular updates using mailing lists, disseminating information to IUKWC members and the wider public.



The Centre's activities were guided by five key cross-sectoral themes.



The five cross-sectoral themes of the India UK Water Centre

Reflecting the maturity of the India-UK research partnership, which was evolving to focus on jointly addressing global challenges, the decision was taken to close the Centre as of the end of September 2020. The purpose of this report is, therefore, to provide an update of the final year and a half of operation of the Centre, as well as to highlight its achievements in line with its aim and objectives.

2. IUKWC Activities Recap: July 2016 to January 2019

Over the first two and a half years, the IUKWC delivered almost 90% of its planned activities, with the remainder either in planning or early implementation phases. The activities completed were as follows:

- 4 Science Workshops - one each in Pune and Dehradun, India; and Stirling and Lancaster, UK;
- 8 Researcher Exchanges, of which 5 were led by Junior researchers (1 UK to India; 4 India to UK) and 3 by Senior researchers (2 India-UK and 1 UK-India);
- 3 Pump Priming Projects on the topics of:
 - Hydro-climatic services in the Himalayas;





- Stakeholder engagement in hydro-climatic services in India; and
- The utilisation of EO-based soil moisture observations.
- 1 User Engagement Initiative on the topic of freshwater monitoring frameworks in southern Indian states; and
- 2 Grassroots Field Exposure Sessions on the topics of:
 - Agriculture water demand in the Sundarbans; and
 - Water quality management and source protection in West Bengal, with Kolkata as the case study.

Each of these activities resulted in either an [Activity Report](#), or an Activity Report and a [Water Brief](#), which can be accessed on the IUKWC website. Further details can also be found through the [activities page](#) on the website, as well as the [Project Highlight Report](#).

3. IUKWC Activities Update: February 2019 to September 2020

This period was very busy for the Centre as it focussed its efforts on completing all the activities that had been approved by the

Steering Committee; finalising all publications from past events with the activity leads; and enhancing its communication channels with members and the wider public so as to share all IUKWC outputs as widely as possible. In this section, the activities and publications completed between February 2019 and September 2020 are detailed.

It is important to note that the focus on completion of activities, rather than on new activities was a result of the fact that as of June 2019, the UKCEH-based coordination team were on short-term and no-cost extensions, whilst NERC was awaiting a decision on the future of Indo-UK research relations and in turn, the IUKWC.

3.1. Science Workshops

The Centre held its final two workshops through its ‘lead a workshop’ initiative, at the University of Warwick, UK and JSS Academy of Higher Education and Research (JSSAHER), Mysuru¹. In this final call for workshop leads, a stipulation had been added to ensure that a scientific field visit was included in the planning to enhance the quality of learning, discussions and engagement for delegates. This requirement arose from feedback received by IUKWC in previous events. Planning for these workshops began in November 2018.



¹ The criteria used for selection of leads was undertaken as outlined in [IUKWC \(2017\)](#)



3.1.1 Science and Innovation for Catchment Management

The fifth workshop was held at the University of Warwick, UK between the 8th and 10th May 2019. The topic was proposed and workshop was led by Mr Anthony Parsons (ALP Synergy, Ltd) and Dr Kapil Gupta (IIT Bombay). The aims of the workshop were to:

- Explore and build on existing knowledge and research to enhance collaboration and identify pathways to impact (including relevant NERC-MoES Science);
- Identify gaps in research and innovation that are constraining sustainable catchment management; and
- Explore innovative approaches to monitoring and management, and consider the potential for SMART Rivers as part of integrated catchment management.

The workshop attracted over 80 applications and from these, 30 delegates² were invited to attend based on the information they provided and their connection with the theme of the workshop. The attendees included 19 delegates from the UK and India, each. Originally planned as a three-day workshop, with a field trip to showcase the latest *in-situ* monitoring technology, the structure had to be changed due to a technical fault with the aeroplane that was carrying the Indian delegation to the UK, resulting in a 23-hour

² The criteria used for selection of participants was also undertaken as outlined in [IUKWC \(2017\)](#).

delay in their arrival. The quick thinking of the leads, together with the IUKWC team, resulted in a structure that still enabled discussion and development of problem statements and pre-proposal ideas, but which required scrapping of the field trip. The success of this restructuring was evident in the feedback gathered from delegates at the end of the workshop, with the workshop receiving a 9.1/10 rating overall, where 10 is excellent. The comments shared were overwhelmingly positive, though the key negative feedback was the lack of a field visit, which was sadly unavoidable, as explained above, and especially unfortunate as the field trip would have also enabled the scientific team to meet the field scientists and water professionals working on the ground.

'Making new connections and engaging with research outside of my direct area of research. Very well managed with regard to delayed delegates.'

'I really liked interactive sessions we had and the support from all delegates to throw out all ideas freely'





For more details on the development of the workshop see the workshop [Activity Report](#), and for the recommendations for the future and knowledge gaps that resulted from the discussions, please see [Water Brief 10](#).

3.1.2 Safe and Sustainable Technologies and Strategies for Integrated Freshwater Resource Management

The sixth, and final IUKWC workshop was held at the JSSAHER campus in Mysuru, between 25th and 28th June 2019. ‘Safe and Sustainable Technologies and Strategies for Integrated Freshwater Resource Management’ was proposed and led by Drs Shivaraju H Puttaiah (JSSAHER, India) and David F Jenkins (University of Plymouth, UK). It attracted 74 applications from which 23 Indian delegates and 10 UK delegates were selected to discuss the sustainable strategies urgently needed to tackle the long-term provision of water for drinking and food production in India, and globally.

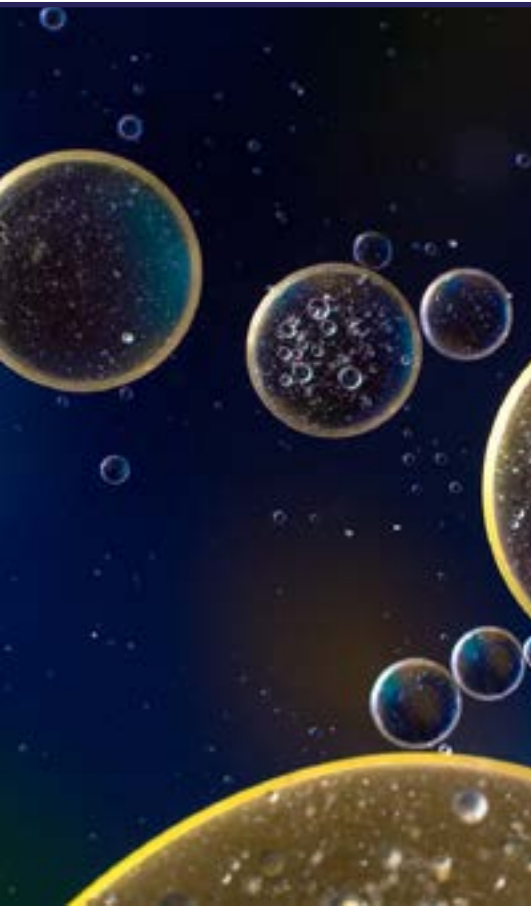
The four-day workshop was designed to enable the sharing of recent science through oral and poster presentations, discussions and group work, as well as networking opportunities and a field trip to an industry with a state-of-art treatment facility (although a more

diverse trip had been planned but was later cancelled due to unavailability of the stakeholders). A key addition to this workshop was the provision for 1-minute pico-presentations by those presenting posters to introduce their work, engage the audience and entice them to visit the posters. This change was introduced because poster presenters tended to feel less important in workshop settings (as gathered from both feedback received from previous IUKWC events, as well as the experience of the IUKWC Secretariat). Hence, by giving them an opportunity to explain why people should go and speak to them, right before having poster sessions that were not just extended tea/coffee breaks, poster presenters became an integral part of the agenda.

This workshop scored a 9.3/10, which is the highest score achieved for a Centre workshop. The primary benefits that delegates reported as having received were: (i) new contacts, (ii) possibility for future collaborations, and (iii) knowledge exchange. The field visit was considered beneficial but respondents did wish it had been more diverse. Overall, however, the group discussions and overall organisation of the event was highly appreciated.

“Group discussion among the participants leading towards identification of key problems and formulation of solution strategy was the best part which is lacking in several other workshops.”

The details of the organisation of the workshop can be seen in the [Activity Report](#), whereas the outcomes of the discussion on the key topic areas that require future research can be found in [Water Brief 16](#).



3.2. Researcher Exchanges

Between August and October 2018, an Open Call for Researcher Exchanges was advertised to all Open Network members through the IUKWC website. The IUKWC Management Board invited applications that met one or more of the following aims at the least:

- Exploring research ideas for future collaborations;
- Building capacity, developing understanding or training in research concepts or methods; and
- Networking and experience of international working (particularly for Junior Exchange).

A total of 21 applications were received (17 Junior and 4 Senior) and vetted using the criteria laid out in IUKWC (2017)³. From this list, five researchers (3 Junior, 2 Senior) were selected to conduct exchanges in 2019. Table 1 outlines the details of these exchanges and their outputs.

³ <https://iukwc.org/sites/default/files/images/Progress%20Report%201.pdf>

Table 1: Researcher Exchanges 2019 – Themes, Candidates and Outputs

Exchange Themes, Candidates		
Junior: Development of Carbon-Based Polymer Composite Produce for Efficient Recovery of Crude Oil in Oil Spill Environment. (Feb-Mar 2019)		
Mr. J. Bloor, Plymouth University, UK	Host: Dr S. S. Gorthi, IISc, Bengaluru, India	Activity Report Blog
Junior: Freshwater Resources Analysis from Water Harvesting Structures in the Sambhar Salt Lake region, Rajasthan (Feb-Mar 2019)		
Ms. P. A. Vicente, University of Exeter, UK	Host: Dr V. Mishra, IIT, Gandhinagar & Dr D. Sharma, Water Wisdom Foundation, India	Activity Report Water Brief 15 Blog
Junior: Establishing a Collaborative Network with Investigators of Future Dams on the Water-Energy- Food-Environment Trade-Offs, Economic Impacts and Water Governance (Mar-May 2019)		
Ms. A. Pradhan, ATREE, India	Host: Dr. Tim Foster, University of Manchester, UK	Activity Report
Senior: System Complexity and Stakeholder Needs - Ensuring River Basin Models for Climate Change are Fit-for-Purpose (May-Jun 2019)		
Professor I. Holman, Cranfield University, UK	Host: Prof. R. Singh, IIT, Kharagpur, India	Activity Report Water Brief 14
Senior: A Water Balance Analysis to Support Sustainable River Basin Management in Desert River Luni, India (Jun - Jul 2019)		
Dr P. Pani, Jawaharlal Nehru University, India	Host: Prof. P.A. Carling, Lancaster University, UK	Activity Report Water Brief 18



“This Researcher Exchange provided a valuable learning opportunity for the Lead researcher.... This fresh and improved perspective will enable the Lead researcher to train young researchers through her teaching at post graduate and M.Phil scale, and in her supervision of PhD students... provided the researchers with an opportunity for developing a long-term collaborative research project...”

Dr P. Pani, Jawaharlal Nehru University (Senior Exchange Researcher)

“Being the Principal researcher of this project allowed me to develop advanced project management skills by taking control of deadlines and budgets, and social science skills by working on field and undertaking interviews with local people”

P. A. Vicente, University of Exeter (IUKWC Junior Exchange Researcher)

3.3. ‘Water Resource Management and Supply in Central India’ Grassroots Field Exposure Session

The third and final Grassroots Field Exposure Session (GFES) was held in Madhya Pradesh from the 25th to 27th February 2019. The activity was led by Dr Pankaj Kumar (IISER Bhopal, India)

who developed the itinerary and organised all the meetings with stakeholders, and who was supported by technical leads Dr Alexandre Gagnon (Liverpool John Moores University, UK) and Dr Sumit Sinha (University of Leeds, UK, now at JBA Risk, UK). The objectives of the GFES were to:

- Gain a better understanding of the grassroots scale management, operations and use of water resources in the region;
- Understand the contribution of the Indira Sagar Dam to assuage water needs of the three sectors and understand the competing and interlinked nature of water demand between the food, water and energy sector;
- Examine how plausible scenarios of future climate and socioeconomic development will impact on the water resources supply and demand in Central India; and
- Formulate research ideas for future joint India UK collaborative projects on the basis of end users' requirements.

An open call for IUKWC members to attend the GFES was published on the website and returned 47 applications, of which 9 were UK applicants and the rest were from India. Following the selection process by IUKWC and the activity leads, 18 applicants were





chosen. Inclusive of the leads and invited scientists, the scientific team stood at 26.

Over 50 farmers across three villages were visited, along with a Public-Private partnership project, an Indian Institute of Soil Science pilot farm, one of the catchment areas within the Rajiv Gandhi Watershed Management Mission, and the Indira Sagar Dam project. Every site visit produced deeper understanding of the ground-level issues and needs, and the challenges stakeholders faced in taking up new methodologies/knowledge/technology; the visits also showed the gaps in knowledge that remained and what future projects could consider. The scientific team was split into groups at the end of the visits and each produced a report on their key take backs and future research needs, which were summarised in the [Activity Report](#) and [Water Brief 17](#).

This event was rated 8.8 out of 10 by 15 respondents, who highlighted the key positive as being the ability to understand ground level impacts of scientific interventions, especially the opportunity to be exposed to and interact with people working in public, private and government partnerships for ground level interventions.

3.4. User Engagement Initiatives

3.4.1 Water Resource Management & Supply in Central India

The second User Engagement Initiative (UEI) was held at IISER Bhopal, between 28th February and 2nd March 2019, immediately after the final GFES. The aim of the UEI was to build on the GFES and introduce Madhya Pradesh State and regional governments to the advances in technology and science that could be of use to their water resources planning and management agendas, whilst enabling the scientists present to learn more about what projects these water professionals were undertaking and what their needs were. Six state and national government departments, six NGOs, private sector and national programmes, including those visited during the GFES, were invited. The cohort of 20 scientists in attendance, were selected from an open call to which 22 IUUKWC members had applied, plus a few of the senior scientists who had attended the GFES.

The focus of the UEI was on improving water resource management in view of the current water resource situation and trend in water supply, particularly on the themes of improving freshwater monitoring frameworks and data. The event consisted of presentations by both





scientists and water professionals from state and regional bodies, as well as poster presentations. The last day consisted of facilitated group discussions that were aimed at encouraging participants to share perspectives on various aspects of freshwater monitoring specific to a sector, and the scientific knowledge available to improve monitoring (including their potential use and limitations). For more details about the event please refer to the [Activity Report](#) and [Water Brief 17](#).

Overall, the participants thought that the UEI was beneficial to them, and 34 respondents rated it 8.7 out of 10. They especially appreciated the diverse spectrum of issues covered, the focus on both local and regional scale impacts, and the cross-sectoral and cross-cultural networking opportunities provided, as well as commending the case-study oriented nature of the presentations, which created a higher level of impact and understanding.

“The meeting showed how there is a communication gap between the policy makers, grassroots implementation and the scientific community. It also highlighted the diversity of issues under a particular sector faced by different types of stakeholders”

3.4.2 Water Resource Management & Science – Supporting One Another

In 2020, the Coronavirus Pandemic hit the entire world, causing country-wide lockdowns in many countries and reduced international travel. This meant that the afore-planned final UEI that was meant to be held in the State of Uttar Pradesh had to be moved online. The IUKWC came up with the idea of holding a virtual UEI consisting of pre-recorded interviews with scientists who had developed or were piloting scientific tools, models and technologies through Indo-UK projects that could be of use to real-world water managers, and decision and policy makers.

A set of seven interviews were conducted, based on pre-set questions that aimed to share the benefits, pathways, challenges and barriers to collaborations between water managers and operators & researchers, and to highlight key research outputs that could be beneficial to water management and operations. An interview was also conducted with the Director, Basin Planning Directorate, Central Water Commission, to showcase not only the fact that collaboration is taking place between researchers and government bodies, but also that collaboration is invited by the latter.

Viewers were given the opportunity to leave comments under each video during the event, which was launched on 9th September and then extended to 17th September 2020. Transcripts of the interviews were available in Hindi, along with useful links and interviewee contacts. These were all done to help initiate contact between stakeholders and scientists. The event had been advertised in various state and regional government mailing lists, Facebook pages, and through targeted emails to key

IUKWC UEI 3: Water Resource Management & Science - Supporting One Another

IUKWC VIRTUAL USER ENGAGEMENT INITIATIVE 2020

Active Date Calendar: Wednesday, September 6, 2020 to Thursday, September 17, 2020

Welcome to 'Water Resource Management & Science - Supporting One Another'

In previous years, IUKWC has hosted [User Engagement Initiatives \(UEI\)](#), which were held in-person, and were focused on providing the update of recent results into policy-relevant projects. The UEIs were designed to bring together scientists with policy makers, regulators or commercial companies to discuss and share ideas, and the challenges and opportunities for future collaborations. This year, due to the COVID-19 pandemic, it has been imperative to physically bring people together, and so the IUKWC brought you this Virtual UEI.

Starting with welcome address from our Partner organisations and in English and also in Hindi, we have got together a set of pre-recorded interviews that cover diverse topics on sustainable water management, planning, and development, for you.

Each video has its own page with a description of the topic covered, a transcript of the interview in Hindi, and the opportunity to send comments. Our Experts will endeavour to respond to your comments up to September 17th 2020, after which the comments section will no longer be available. We would love to know which organisation you are with, so please include that with your comment!

Check out our video panel for further need to engage and for further information. Please do reply your title with us, and we do humbly request that you keep your comments appropriate for public viewing.

Welcome Address (English)

Welcome Address (Hindi)

Expert Videos

Shri. S. Kumar, CWC

DWASA

UPSCAPE

Groundwater Assessment

Alluvial Aquifers

SUDH Water

COAGWC India - A

COAGWC India - B

Shri. Sunil Kumar, CWC

Working Together - Inspiration from the Ground, Best Planning Strategies, Central Water Commission

September 06 | Sunil Kumar, Director of Best Planning Strategies, Central Water Commission

00:00:00

Screenshots from the virtual User Engagement Initiative

stakeholders, as well as through the IUKWC open network mailing list, twitter account and Facebook page.

Each video was viewed at least 50 times in the first three days, with a total number of views to September 13 reaching 480 for all researcher videos together, and 112 for the CWC Director's video. The main event page itself was accessed well over 400 times. There is also evidence that videos have been downloaded by some stakeholders and shared with their colleagues. The videos can be viewed on the IUKWC website [here](#).

3.5. Pump Priming Projects

The final two Pump Priming Projects (PPPs) were commissioned and completed between June and November 2019. Both proposals arose from the first GFES held in the Sundarbans and were subsequently based on the island's water resources.





3.5.1 Improving Our Understanding of the Aquifer System in the Sundarbans

The penultimate PPP was co-led by Dr Gopal Krishan of National Institute of Hydrology (NIH) Roorkee, Dr Purnaba Dasgupta of Rajarhat PRASARI Kolkata, and Dr Andrew McKenzie of the British Geological Survey. The aim of the project was to improve the understanding of the aquifer systems in the Sunderbans by developing a conceptual model of the island's aquifer system and its extent, collating data on the aquifer properties, and reviewing the potential and cost/benefits of aquifer storage and recovery (ASR) for the islands. The project team, uniquely, involved a team of women from the two village blocks selected for the pilot, who had been initially trained by PRASARI to undertake basic groundwater monitoring using the ever increasing number of borewells in the area. The women, who refer to themselves as 'Barefoot Hydrologists', received further training during the project, and along with over 100 farmers, and key village-level water officers, were engaged in field surveys and workshops to help gather the data required for the study. Five unique state and national government organisations were also involved in the project. For a detailed description of the project findings please refer to the [Activity Report](#). The project

concluded that ASR has good potential in the area to meet existing and future freshwater demand, and further established that participatory research projects that involve local stakeholders are more likely to be successful. For details on future research and recommendations please see [Water Brief 11](#).

‘We came to know about the solution to our water crisis. Particularly meetings with PRASARI, NIH and BGS showed us a light at the end of the tunnel to bridge the gap of salinity and water crisis.’

Community members from Gosaba

3.5.2 The Influence of the Monsoon on Freshwater Availability for Agriculture in the Sundarbans Region of West Bengal, India, Under Current and Climate Change Conditions

The fifth and final PPP was co-led by Prof. Lalu Das (Bidhan Chandra Krishi Viswavidyalaya, India) and Dr Alexandre Gagnon (Liverpool John Moores University, UK), who first evaluated the performance of the General Circulation Models (GCMs) of the Coupled Model Intercomparison Project Phase 5 (CMIP5) over the Sundarbans region, after which they constructed downscaled scenarios of





rainfall under climate change for the Sundarbans region using the best CMIP5 models identified, and investigated the impacts on livelihoods and community adaptation to predicted changes in water resource availability. During this PPP over 200 farmers, as well as local NGOs and government representatives were engaged through field-based workshops, and six Indian PhD students were trained on new technologies, as well as modelling and stakeholder survey methods. This pilot project concluded that the CMIP5 GCMs predicted increased monsoon precipitation, but also an increase in evapotranspiration which may offset any net gains in water resource availability from rainfall. This, along with rising sea levels and salt water intrusion, would mean significant freshwater resource deficiencies, for which the community is not prepared. For more on the structure of the activity and the key conclusions please refer to the [Activity Report](#) and [Water Brief 12](#).

The results from both these PPP were shared with Open Network members and the wider public, through a joint webinar held on 4th February 2020. Over 100 people were in attendance from academic and research institutions, as well as state and national government departments. The webinar was considered beneficial in sharing the

unique challenges faced in the Sundarbans and potential pathways for future planning, by all 21 respondents who filled in the post-webinar survey.

3.6. Webinar Series 2020

During the period 28th May to 16th September 2020, the IUKWC held it's Webinar Series with the aim to showcase the breadth of Indo-UK water research/practice and its impacts, as well as outputs and learnings from IUKWC activities. Webinar topics were gathered from both invitations to project leads of IUKWC activities and open calls to the Open Network membership. A total of 9 webinars on a variety of topics were held using the GotoWebinar© platform.

Details of the webinar topics, presenters, number of attendees, and feedback received is shown in Table 2 below. The webinars were always well attended, normally ranging between 80 and 110 attendees on average, though the highest attendee number peaked at 525 for the fourth webinar. Attendees were mostly from academic institutions (researchers and students), however businesses including consultancies and industry, as well as government departments from both countries, also attended.



Table 2: IUKWC Webinar Series 2020 in summary (*% audience who responded to feedback form)

Date	Title and Presenter	# Attendees	Rating	Benefits Gained
28 th May 2020	Occurrence of pharmaceuticals and personal care products in the aqueous environment <i>Dr Akanksha Singh Kachhawaha, Gujarat Forensic Sciences University, India</i>	153	4.2/5 from 44%*	Knowledge – 24% Interest in subject matter – 48% Both above – 24% None of the above – 2%
11 th June 2020	The latest phase of global climate models for end user: how confident are we in using them for risk analysis and decision support? <i>Dr Chandra Rupa Rajulapathi, Centre for Hydrology, University of Saskatchewan, Canada</i>	87	4.2/5 from 40%	Knowledge – 43% Interest in subject matter – 40% Both above – 17% None of the above – 0%
25 th June 2020	Developing an interactive web-application to aid drought decision making in Maharashtra State <i>Dr Rajendra Pandey (National Institute of Hydrology, India); Dr Simon Parry & Mr Thomas Chitson (UK Centre for Ecology & Hydrology)</i>	115	5/5 from 30%	Knowledge – 17% Interest in subject matter – 57% Both above – 26% None of the above – 0%
9 th July 2020	Understanding River System and Pollution Management: A case study of Water Quality of the Ganga River around Patna due to Lockdown, a natural remedy? <i>Prof. Ramkar Jha, National Institute of Technology Patna, India</i>	525	4.4/5 from 40%	Knowledge – 30% Interest in subject matter – 48% Both above – 18% None of the above – 3%
23 rd July 2020	Informing catchment management decisions based on ecosystem services modelling in the Himalayas <i>Dr Andrea Momblanch (Cranfield University, UK) & Dr Sumit Sen (Indian Institute of Technology, Roorkee, India)</i>	85	4.4/5 from 45%	Knowledge – 55% Interest in subject matter – 21% Both above – 24% None of the above – 0%

6 th Aug 2020	Sustainable provision and access to drinking and irrigation water in rural communities, even during times of pandemic – such as with Covid-19, and the effect of lockdown <i>Dr David Jenkins (University of Plymouth, UK) and Dr Shivaraju Puttaiah (JSS Academy of Higher Education and Research, India)</i>	97	4.2/5 from 42%	Knowledge – 29% Interest in subject matter – 49% Both above – 20% None of the above – 2%
19 th Aug 2020	Water Resource Planning Under Future Climate and Socioeconomic Uncertainty in the Cauvery River Basin in Karnataka, India <i>Dr Ajay Bhave (Newcastle University, UK)</i>	101	4.2/5 from 41%	Knowledge – 51% Interest in subject matter – 20% Both above – 29% None of the above – 0%
2 nd Sep 2020	Threats to Human Health from Water- Associated Diseases: How Can Remote Sensing Help? <i>Dr Shubha Sathyendranath (Plymouth Marine Laboratory, UK), Dr Nandini Menon N (Nansen Environmental Research Centre India), Dr Anas Abdulaziz (CSIR-National Institute of Oceanography, India), & Dr Grinson George (ICAR-Central Marine Fisheries Research Institute, India)</i>	100	4.5/5 from 53%	Knowledge – 45% Interest in subject matter – 30% Both above – 25% None of the above – 0%
16 th Sep 2020	Restoration of urban lakes: a case study of Bengaluru, India <i>Prof. Laurence Carvalho (UK Centre for Ecology & Hydrology) & Dr Priyanka Jamwal (Ashoka Trust for Research in Ecology and the Environment, India)</i>	111	4.3/5 from 43%	Knowledge – 42% Interest in subject matter – 23% Both above – 35% None of the above – 0%

3.7. Publications

Thirty one publications were finalised and published during this period. However, for sake of completeness, Table 3 contains all Activity Reports and Water Briefs that have been published by the Centre throughout its tenure.

Table 3: Publications from all IUKWC activities in reverse chronological order (*GFES – Grassroots Field Exposure Session; PPP- Pump Priming Project; RE – Researcher Exchange; UEI – User Engagement Initiative)

Citation	Activity Type*	Date Published
Pani, P and Carling, P (2020). Water balance analysis to support sustainable river basin management in desert rivers. Water Brief 18. The India-UK Water Centre. Wallingford, UK and Pune, India. 21 pp.	Senior RE (India to UK)	August 2020
Pani, P & Carling, P (2020). A Water Balance Analysis to Support Sustainable River Basin Management in Desert River Luni, India: Report of Research Exchange June 2019. The India-UK Water Centre. Wallingford, UK and Pune, India.		
Sinha S, Kumar, P & Gagnon, A (2020). Water Resource Management & Supply in Central India: Report of Grassroots Field Exposure Session - February 2019. The India-UK Water Centre. Wallingford, UK and Pune, India.	GFES	June 2020
Sinha S, Kumar, P & Gagnon, A (2020). Water Resource Management & Supply in Central India: Report of User Engagement Initiative - February – March 2019. The India-UK Water Centre. Wallingford, UK and Pune, India.	UEI	June 2020
Gagnon, A, Kumar, P and Sinha, S. (2020) Water Resource Management and Climate Change Adaptation in Central India. Water Brief 17. The India-UK Water Centre. Wallingford, UK and Pune, India. 25 pp.	GFES & UEI (Joint publication)	June 2020
Gagnon, A, Kumar, P and Sinha, S (2020) Water Resource Management and Climate Change Adaptation in Central India. Water Brief 17. The India-UK Water Centre. Wallingford, UK and Pune, India. 25 pp.		

Vicente, P. A. (2020). Freshwater resources analysis from Water Harvesting Structures in the Sambhar Salt Lake region, Rajasthan. Water Brief 15. The India-UK Water Centre. Wallingford, UK and Pune, India. 23 pp	Junior RE (UK to India)	May 2020
Vicente, P. A. (2020). Freshwater resources analysis from Water Harvesting Structures in the Sambhar Salt Lake region, Rajasthan. Report of Researcher Exchange March 2019. The India-UK Water Centre. Wallingford, UK and Pune, India.		
Pradhan, A. & Foster T. (2020). Post facto assessment of dams in Maharashtra, India in collaboration with FutureDams Consortium UK: Report of Researcher Exchange May 2019. The India-UK Water Centre. Wallingford, UK and Pune, India.	Junior RE (India to UK)	April 2020
Mishra, V. & Sembhi, H. (2020). Integrating remotely sensed observations of surface water storage with climate forecast for freshwater management. Report of Senior Research Exchange March 2020. The India-UK Water Centre. Wallingford, UK and Pune, India.	Senior RE (India to UK)	March 2020
Shivaraju H. Puttaiah & Jenkins, D. F. (2020). Safe and Sustainable Technologies and Strategies for Integrated Freshwater Resource Management: State of Art Approaches: State of Art Approaches. Water Brief 16. The India-UK Water Centre. Wallingford, UK and Pune, India. 19 pp	Science Workshop	February 2020
Shivaraju H. Puttaiah, & Jenkins, D. F. (2019). Safe and Sustainable Technologies and Strategies for Integrated Freshwater Resource Management: Report of Scientific Workshop held in June, 2019. The India-UK Water Centre. Wallingford, UK and Pune, India.		May 2020
Atkinson, P. M. and Chakravarthi, V. (2020). Advancing Drought Monitoring, Prediction and Management Capabilities. Water Brief 13. The India-UK Water Centre. Wallingford, UK and Pune, India. 21 pp	Science Workshop	February 2020
Atkinson, P. M. and Chakravarthi, V. (2020). Advancing Drought Monitoring, Prediction and Management Capabilities: Scientific Workshop Report September 2018. The India-UK Water Centre. Wallingford, UK and Pune, India.		
Krishan G., Dasgupta P., and McKenzie, A. (2020) Understanding aquifer systems of Indian Sundarbans. Water Brief 11. The India-UK Water Centre. Wallingford, UK and Pune, India. 31 pp	PPP	February 2020
National Institute of Hydrology, Roorkee (2020). Improving our understanding of the aquifer systems in Sundarbans: December 2019. The India-UK Water Centre. Wallingford, UK and Pune, India.		

Holman, I. and Singh, R. (2020). System Complexity and Stakeholder Needs: Ensuring river basin models for climate change adaptation are fit-for-purpose. Water Brief 14. The India-UK Water Centre. Wallingford, UK and Pune, India. 27 pp.	Senior RE (UK to India)	February 2020
Holman, I. and Singh, R. (2020). System Complexity and Stakeholder Needs: Ensuring river basin models for climate change adaptation are fit-for-purpose. Report of Senior Researcher Exchange May 2019. The India-UK Water Centre. Wallingford, UK and Pune, India.		
Das L., Gagnon A.S., Roy I., and Saha G. (2020). Freshwater Availability for Agriculture in Sundarbans. Water Brief 12. The India-UK Water Centre. Wallingford, UK and Pune, India. 29 pp.	PPP	February 2020
Das L., Gagnon A.S., Roy I., and Saha G. (2020). Climate change impacts on freshwater availability for agriculture in Sundarbans, India: Report of Pump Priming Project. The India-UK Water Centre. Wallingford, UK and Pune, India.		
Parsons, A. and Parsons, L. (2020). Science and Innovation for Catchment Management. Water Brief 10. The India-UK Water Centre. Wallingford, UK and Pune, India. 21 pp.	Science Workshop	January 2020
Parsons, A. and Parsons, L. (2020). Science and Innovation for Catchment Management: Report of Scientific Workshop 8th - 10th May 2019. The India-UK Water Centre. Wallingford, UK and Pune, India.		
Allan, R. and Tiwari, M. (2020). Water Quality in Kolkata: Management and monitoring of pollution, with a special focus on Arsenic and Fluoride in groundwater. Water Brief 09. The India-UK Water Centre. Wallingford, UK and Pune, India. 19 pp.	GFES	January 2020
Allan, R. and Tiwari, M. (2020). Water quality management and source protection in West Bengal: GFES March 2019. The India-UK Water Centre. Wallingford, UK and Pune, India.		
Tebbs, E., Wilson, H., Mulligan, M., Chan, K., Gupta, M., Maurya, V., Srivastava, P. (2019). Satellite Soil Moisture Observations: Applications in the UK and India. Water Brief 07. First Edition. Pp 29. The India-UK Water Centre. Wallingford, UK and Pune, India.	PPP	December 2019
Tebbs, E., Wilson, H., Mulligan, M., Chan, K., Gupta, M., Maurya, V. and Srivastava, P. (2019). Satellite Soil Moisture Observations: Applications in the UK and India. Report of Pump Priming Project. The India-UK Water Centre. Wallingford, UK and Pune, India.		

Das, L. and Joshi, D. (2019). Agricultural water demand in West Bengal: Key gaps and needs of the Sundarbans Delta. Water Brief 08. The India-UK Water Centre. Wallingford, UK and Pune, India. 23 pp.	GFES	December 2019
Joshi, D. & Das, L. (2019). Agricultural Water Demand in West Bengal: Report from the 1st Grassroots Field Exposure Session 10th to 12th December 2018. The India-UK Water Centre. Wallingford, UK and Pune, India.		
Bloor, J., Vikram, S., and Gorthi, S. (2019). Development of a carbon-based polymer composite product for efficient recovery of crude oil in oil spill environments. Junior Researcher Exchange March 2019. The India-UK Water Centre. Wallingford, UK and Pune, India.	Junior RE (UK to India)	November 2019
Widmann, M. and Tayal, S. (2019). Integrating Precipitation Forecasts and Climate Prediction with Basin-Scale Hydroclimatic Modelling in the Himalayas: Report of Scientific Workshop, 2th–4th May 2018. The India-UK Water Centre. Wallingford, UK and Pune, India.	Science Workshop	June 2019
Fones, G and Jamwal, P. (2019). Passive sampling devices to improve the monitoring of anthropogenic pollutants in river catchments in India: Report of Researcher Exchange May 2017. The India-UK Water Centre. Wallingford, UK and Pune, India.	PPP	May 2019
Kachhawaha, A. S. and Boxall, A. B. A. (2019). A Small Scale Monitoring Study for a Range of Pharmaceuticals in the River Foss Catchment and Comparison to Concentrations in the River Nag, India. Report of Researcher Exchange March 2018. The India-UK Water Centre. Wallingford, UK and Pune, India.	Junior RE (India to UK)	May 2019
Joshi, P. and Petrie, A. (2018). Improving Freshwater Monitoring Frameworks for Data and Research Management: Report of User Engagement Initiative - January 2018. The India-UK Water Centre. Wallingford, UK and Pune, India.	UEI	November 2018
Bharucha, Z. P., Sosa, M., Bhave, A., Chattopadhyay, R., Green, M. and Krishnaswamy, J. (2018) Stakeholder engagement in hydro-climatic services in India. Brief 06 The India-UK Water Centre. Wallingford, UK and Pune, India. 28 pp.	PPP	October 2018
Bharucha, Z.P., Chattopadhyay, R., Bhave, A., Green, M., Krishnaswamy, J. (2019). Stakeholder Engagement in Hydro-climatic Services in India: Report of Pump Priming Project. India-UK Water Centre, Wallingford, UK and Pune, India.		April 2019

Widmann, M. (2018). Developing Hydro-climatic Services in the Indian Himalayas. Water Brief 04. The India-UK Water Centre. Wallingford, UK and Pune, India. 25 pp	PPP	April 2018
Widmann, M., R. Blake, K.P. Sooraj, A. Orr, J. Sanjay, A. Karumuri, A.K Mitra, E.N. Rajagopal, A.F. Van Loon, D.M. Hannah, N. Barrand, R. Singh, V. Mishra, F. Sugden, and D.S. Arya. (2019). Current Opportunities and Challenges in Developing Hydro-Climatic Services in the Himalayas: Report of Pump Priming Project 2017. The India-UK Water Centre. Wallingford, UK and Pune, India.		November 2019
Tyler, A. and Dash, M. (2018). Enhancing Freshwater Monitoring Through Earth Observation: Report of Scientific Workshop: 19–21 June 2017. The India-UK Water Centre. Wallingford, UK and Pune, India.	Science Workshop	January 2018
Rupa, C. (2017). Quantifying resilience of water infrastructure to extreme precipitation events in urban areas: Report of Researcher Exchange May 2017. India-UK Water Centre. Wallingford, UK and Pune, India.	Junior RE (India to UK)	December 2017
Daly, M., Lobo, C and D'Souza, M. (2017) Toward the Co- Production of Hydro-climatic Services. Water Brief 03. The India-UK Water Centre. Wallingford, UK and Pune, India. 18 pp	Junior RE (UK to India)	August 2018
Daly, M., Lobo, C., D'Souza, M. (2017). Consolidating Learning About Stakeholder Engagement from Research and Practice: Toward the Development of Hydro-climatic Services: Report of Researcher Exchange 30 August 2017. The India-UK Water Centre. Wallingford, UK and Pune, India.		December 2017
Tyagi, N. K. and Mehta, L. (2018) Water Energy-Food Security Nexus. Water Brief 05. The India-UK Water Centre. Wallingford, UK and Pune, India. 24 pp	Senior RE (India to UK)	August 2018
Tyagi, N.K. (2017). Understanding Water–Energy–Food Security Nexus to Design Technology and Policy Approaches for Enhanced Adaptation to Climate Change in India, Report of Researcher Exchange, June 2017. The India-UK Water Centre. Wallingford, UK and Pune, India.		November 2017
Sen, S. and Momb Blanch, A. (2018) Integration of Ecosystem Services into catchment management. Water Brief 02. The India-UK Water Centre. Wallingford, UK and Pune, India. 16 pp	Junior RE (India to UK)	March 2018
Sen, S., Momb Blanch, A. (2017). Ecosystem Services Assessment and its Implementation in UK: Report of Researcher Exchange May15–June 2, 2017. India-UK Water Centre. Wallingford, UK and Pune, India.		October 2017

IUKWC (2017) Developing Hydroclimatic Services for Water Security. Water Brief 01. The India-UK Water Centre. Wallingford, UK and Pune, India. 18 pp	Science Workshop	April 2017
The India-UK Water Centre (2017). Developing Hydro-climatic Services for Water Security: Report on Scientific Workshop 29 November-1 December 2016. Centre for Ecology & Hydrology, Wallingford and Indian Institute of Tropical Meteorology, Pune.		

Towards the end of the Centre’s tenure, both [Water Briefs](#) and [Activity Reports](#) were made publicly accessible, as previously only the former were available to download by the public. Data from the website indicate that these publications have been considered useful by the community; for the period February 2019 to September 2020, 474 Reports and 685 Briefs had been downloaded. Water Briefs had also been printed and shared at the Centre’s various activities and events, as well as at external events (Section 4.3.1). Prior to closure, sets of all Water Briefs were also sent to various government department libraries across India.

4. Measuring Achievements

The IUKWC Management Board had developed proxies against which success towards achieving the aim of the Centre could be measured over its lifespan. These proxies included:

- Level of membership to the Open Network of India-UK Water Scientists, over time (including sub-metrics to identify diversity of scientific interest, location, organisation);
- Reach of online communications (including website hits, social media statistics);
- Levels of engagement with activities over time (including numbers of proposals/applications; and sub-metrics to identify diversity of scientific interest, location, organisation); and
- Collaboration proxies such as: recording numbers of new connections made (for example, pre- and post-events), metrics of numbers of collaborative proposals/papers that might be derived from activities, and anecdotal evidence of new Indo-UK networking outside of Centre activities.

This section outlines how well the IUKWC met its stated aim and objectives.

4.1. Open Network of Water Scientists

Membership rose steadily since inception of the Centre, topping off at 1060 just before the Centre closed (Figure 1). This was an increase from January 2019 when the number stood at 801. Even though all activities were targeted at Indian and UK water stakeholders, the Open Network did attract members from 22 institutions around the world, including North and South America, Africa, and Australasia. Number of members from India were always going to be higher than those from the UK, but the increasing trend was seen in both countries (Figure 2).

Figure 1: All IUKWC Open Network Members over time

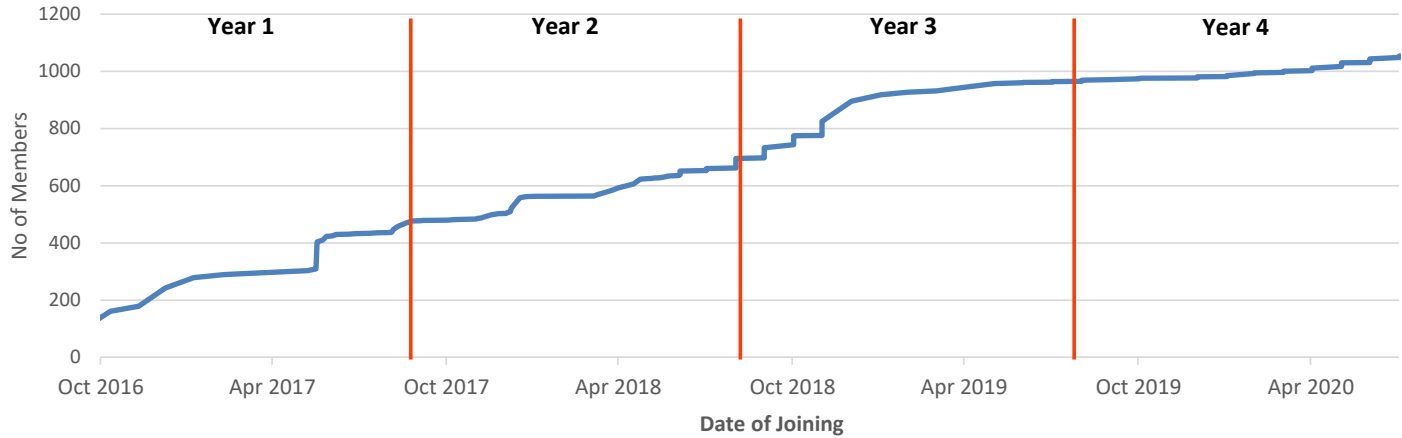
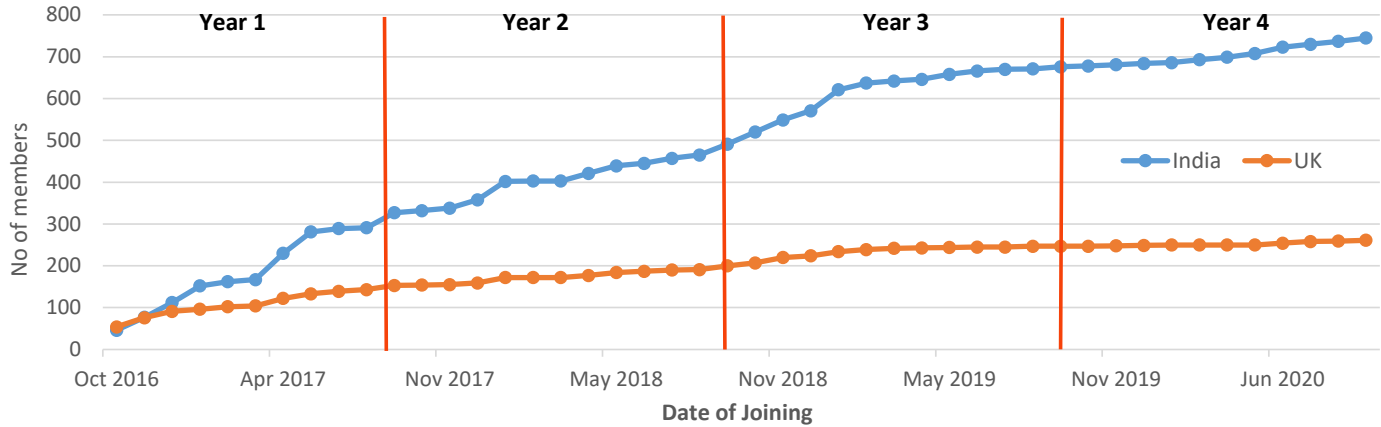


Figure 2: IUKWC Members split between India and the UK over time

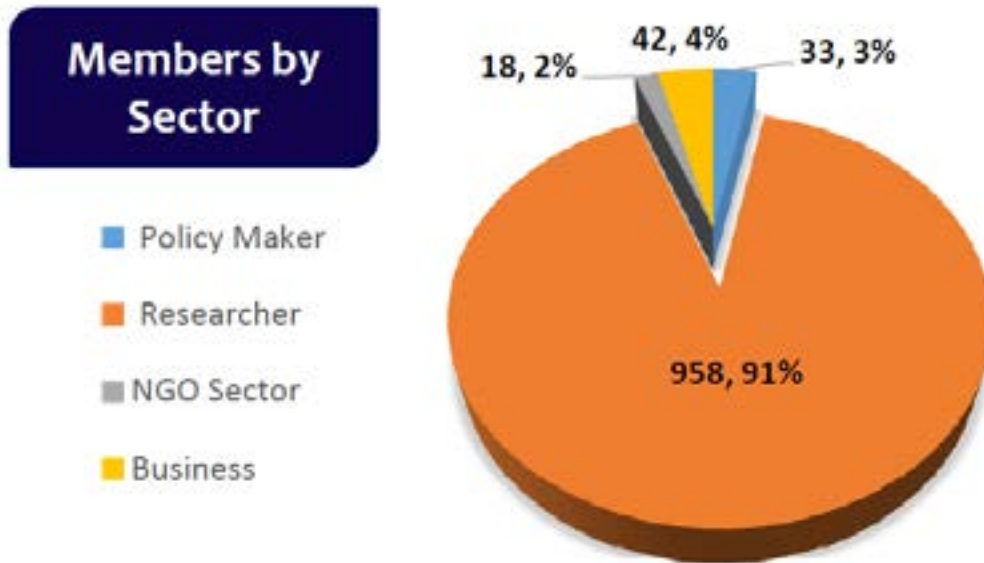


The diversity of members is another highlight of the Network, which had members from a large range of institutions, spread across the two countries. There was no bias in the Indian membership towards top end institutions, and many members represented universities and colleges in small towns and villages in India. As a result, all states in India except Arunachal Pradesh, had at least one IUKWC member. In the UK, members also reflected a broad geographical spread. Overall, there were 142 cities/towns/villages represented in the Open Network from India, and 60 from the UK. This in turn, translated to members from 710 institutions in India and 269 institutions in the UK.

Membership was also diverse in terms of sectors represented (Figure 3). Although the majority were researchers (including students), there were 18 representatives from the NGO sector, 42 from business and 33 from government.



Figure 3: IUKWC Members by Sector



4.2. Communication Reach

The IUKWC employed a variety of communication methods to reach out to water scientists and stakeholders, and the wider public in both countries (as shown on the next page).

The website was the main conduit for information, housing a news section for IUKWC Open Calls and events, as well as a community news section, along with pages on activities, publications, Indo-UK projects and the Open Network. Members of the Open Network had access to all pages, including activity reports, thereby encouraging others to join the network. Since decommissioning, all publications are now available to the general public.

The number of unique visits to the website doubled from January 2019, when it was around 11,000 to over 23,000 in September 2020. The pages viewed per session had decreased from 7.75 to 6.4 as the number of Open Calls reduced and the website was more streamlined. However, the percentage of users leaving without viewing a second page reduced drastically from 13% to 3.34%, which is indicative of an increase in interest in the content on the website.





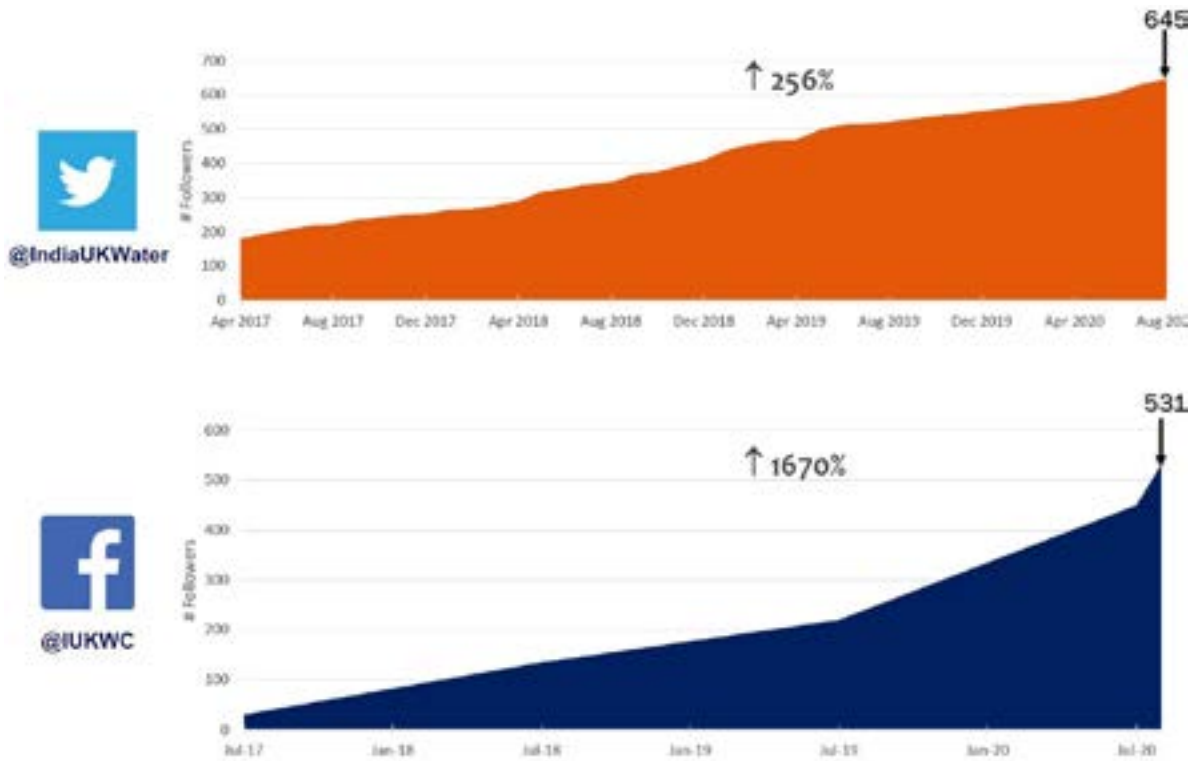
Methods of communication used by the IUKWC

Social media was the second conduit through which the Centre engaged with its members and the public. Followers of both social media accounts continued to rise from the inception of the accounts, with a rise of 256% in Twitter followers, and a massive 1670% in Facebook followers (Figure 4). The impressive increase in Facebook followers may be linked to the fact that the IUKWC was also following and linking with approximately 20 Government and NGO Facebook pages and groups to enhance the visibility of IUKWC.

Email was the key method through which the IUKWC maintained contact with its members. In the final year, this was upgraded to a monthly, formatted bulletin to help promote the newly published outputs, as well as the webinar series. Mailing lists and email contacts were also used for engagement with government departments. These contacts had been developed over the years through interaction at external events, as well as IUKWC events to which government representatives were always invited. At the time of closure, the Centre had accumulated over 200 contacts for government departments in India.



Figure 4: Social media followers over time



4.3. Enhancing Engagement

Throughout the sections above, it is clear how diverse and varied the scientist focus, locations and institutions involved were, for the activities and events that were held over the final year of the Centre. This was the continuation of the trend set in the first three years. In this sub-section, however, the engagement with the outside is presented, to showcase the work that was done in ensuring that the Centre increased its visibility and that of the outputs from the various activities and events, so as to promote future collaborations and partnerships in the area of water between the two countries.

4.3.1 Government, NGOs and Business

Seventy two unique District, State & National Government Departments across India had been engaged through various activities. This number increases to 132 when local communities, NGOs and businesses are included. Representatives from these groups were invited, as relevant, to activities held in India, and where possible in the UK. As a result, the IUKWC hosted 27 representatives at workshops, 40 at UEI, and 30 at GFES events. The Centre was also showcased at a few external events over the past two years. These included, the 2nd International Conference





on Sustainable Water Management, 2019, Pune that was hosted by the Water Resources Department, and the Roorkee Water Conclave 2020. These were further opportunities to engage with government, NGO and business.

4.3.2 Media

In order to share the work that IUKWC was doing with other stakeholders, media coverage was particularly useful during the UEI events. This enabled messages about the issue being discussed to be shared with the public, as well as showcasing Indo-UK scientific collaboration. In all cases, local, vernacular media were targeted by the leads to ensure wider dissemination of the message within the state.

4.4. Promoting Collaboration

Collaborations between Indian and UK scientists and between scientists and stakeholders was one of the primary objectives of the Centre. As such, all its activities and events included opportunities to promote collaborations.

Starting with the Open Network which on the IUKWC website, had search functionality to allow for members to find other members with similar or specific research interests in either country. For the period between February 2019 and September 2020, 364 unique searches were done on this database, whereas 520 unique searchers were conducted of the more widely available Open Network list. This is a proxy indication that collaboration was of interest to members, at the very least.

Moving onto IUKWC activities. The IUKWC Science workshops were designed to give opportunities to Indo – UK researchers to share their science and build networks. Evidence of the success of this comes from the Stirling workshop, which led to an Indo-UK proposal being developed and short-listed for GCRF funding. IUKWC Research Exchanges have proved to be a tool for both senior and early career researchers from India and UK to build ideas and long-term collaborations, and for training. This is exemplified by the quote from two researchers who met in the first workshop, developed a researcher exchange proposal, and have since been working together:



വേമ്പനാട് കായൽ താലിന്യവിജ്ഞതാക്കാൻ നിരീക്ഷണ സംവിധാനം വേണം: ഗവേഷക സംഗമം

കൊല്ലം വേമ്പനാട് കായൽ താലിന്യവിജ്ഞതാക്കാൻ ഉപയോഗിക്കേണ്ട സംവിധാനം കണ്ടെത്തണമെന്നും ഏകീകൃതമായ ഒരു നിയന്ത്രണ സംവിധാനം തയ്യാറാക്കണമെന്നും ഗവേഷക സംഗമം ചർച്ചകൾക്കിടയിൽ തീർപ്പാക്കി. കേരളത്തിലെ ഏറ്റവും വലിയ താലിന്യവിജ്ഞതാക്കാൻ കായൽ വർദ്ധിക്കുന്നതിനെ തടയാൻ കഴിയുന്ന വിവിധ ഉപാധകൾ സംഗമത്തിൽ തീർപ്പാക്കി. കേരളത്തിലെ ഏറ്റവും വലിയ താലിന്യവിജ്ഞതാക്കാൻ കായൽ വർദ്ധിക്കുന്നതിനെ തടയാൻ കഴിയുന്ന വിവിധ ഉപാധകൾ സംഗമത്തിൽ തീർപ്പാക്കി.

Fri, 25 January 2018
deepika.sapra.in/c/25766029



വേമ്പനാട് കായൽ ശുചിയാക്കാൻ ജീവശാസ്ത്ര സഹായം തേടണം

വേമ്പനാട് കായൽ ശുചിയാക്കാൻ ജീവശാസ്ത്ര സഹായം തേടണം. കായൽ താലിന്യവിജ്ഞതാക്കാൻ ഉപയോഗിക്കേണ്ട സംവിധാനം കണ്ടെത്തണമെന്നും ഏകീകൃതമായ ഒരു നിയന്ത്രണ സംവിധാനം തയ്യാറാക്കണമെന്നും ഗവേഷക സംഗമം ചർച്ചകൾക്കിടയിൽ തീർപ്പാക്കി.

Call to use new tech to check pollution of Vembanad lake

Meet lays stress on real-time monitoring system

Several stakeholders were engaged as part of an Indo-US research project, called for the setting up of a system for real-time monitoring of pollution in Vembanad lake with the support of satellite and remote sensing technology.



Around 1.6 million people live along the shores of Vembanad lake, says experts.

Experts are calling for a real-time monitoring system to be set up, a speaker during a panel discussion.

Satellite and monitoring technologies can be used to develop a system of remote real-time checks on the lake, says experts.

The project is being funded by the Indo-US water quality project, organized by the National Water Research Institute (NWRI), a joint venture between India and US, to help improve water quality.

"The lake is highly polluted and we need to use the latest technologies to check the pollution in real-time," said a speaker during the panel discussion.

The panel also stressed that a smart irrigation system, incorporated with the latest technology should replace the existing irrigation system in India that caused loss of water.

The project is coordinated by the Ministry of Earth Science and the National Environmental Research Council, US.

A.S. Jithu, one of the coordinators of the project, said that a study would be conducted to assess the risk to public health owing to the

Experts call for real-time check on Vembanad Lake

From News Services



Experts are calling for a real-time monitoring system to be set up, a speaker during a panel discussion.

Satellite and monitoring technologies can be used to develop a system of remote real-time checks on the lake, says experts.

The project is being funded by the Indo-US water quality project, organized by the National Water Research Institute (NWRI), a joint venture between India and US, to help improve water quality.

"The lake is highly polluted and we need to use the latest technologies to check the pollution in real-time," said a speaker during the panel discussion.

The panel also stressed that a smart irrigation system, incorporated with the latest technology should replace the existing irrigation system in India that caused loss of water.

The project is coordinated by the Ministry of Earth Science and the National Environmental Research Council, US.

A.S. Jithu, one of the coordinators of the project, said that a study would be conducted to assess the risk to public health owing to the





“Thank you to India UK Water Centre for their support... We met in a workshop in Pune, that led to a Junior Exchange, in 2017, and since then we have been collaborating and have developed a proposal, we hope will get funded, and are keen to continue to work together and with others interested in this topic.”

**Dr A Momblanch, Cranfield University & Dr S Sen, IIT Roorkee
(Junior Researcher Exchange, 2017 & Webinar 5)**

The Pump Priming Projects were designed to take forward ideas or provide preparatory groundwork for future IUKWC activities, which they did quite well. The PPP on “Current opportunities and challenges in developing hydro-climatic services in the Himalayas” led to the workshop in Dehradun. The UK lead (University of Birmingham) subsequently developed a project entitled, ‘HEavy precipitation forecast Post-processing over India’ (HEPPI), which is now funded under the Weather and Climate Science for Service Partnership India (WCSSP India) programme. More recently, the PPP on “Improving Our Understanding of the Aquifer Systems in Sundarbans” not only resulted in a pilot project that the local community have appreciated, but also led to the training of local peoples, as evidenced by this quote from the ‘Barefoot Hydrologists’ (see section 3.5 above).

'Participation in the field together with the scientists and community taught us ground water management with ease'

Barefoothydrogeologists from Sandeshkhali II

The leads of the PPP have also developed further proposals for pilot projects on Aquifer Recharge and Storage systems for funding. This latter PPP was the outcome of the first GFES, which were designed to expose the India–UK scientific community to field-scale issues and operations and to progress the concept of co-production and co-design. This was especially evident in the partnership between NIH, BGS and PRASARI that resulted in this penultimate PPP on groundwater. PRASARI had been one of stakeholders visited during the PPP. Collaboration was also evident in the co-authoring of two papers by scientific team members out of the second⁴ and third GFES⁵.

Finally, the UElS were all focussed on encouraging interaction between scientists and stakeholders to enable translation of scientific output to policy/practice and promote co-production of future science. Though the actual realisation of such collaborations takes time, as evidenced above in the case of the HEPPI project, which took three years to materialise, anecdotal evidence that the events were useful to both parties can be found.

⁴ Everard, M., Kangabam, R., Tiwari, M.K. et al. Ecosystem service assessment of selected wetlands of Kolkata and the Indian Gangetic Delta: multi-beneficial systems under differentiated management stress. *Wetlands Ecol Manage* 27, 405–426 (2019). <https://doi.org/10.1007/s11273-019-09668-1>

⁵ Everard, M., Ahmed, S., Gagnon, A.S. et al. Can nature-based solutions contribute to water security in Bhopal? *Science of the Total Environment* 723, 138061 (2020). <https://doi.org/10.1016/j.scitotenv.2020.138061>



Feedback from the first and second UEIs showed that 100% of the respondents made new contacts during the events. Furthermore, the respondents appreciated the platform for the two communities to network with each other. Interestingly, the water professionals from government departments also commented that they appreciated being able to meet with colleagues from other departments, with whom they rarely have contact.

The nature of the third UEI meant that the evidence gathered to show potential for collaboration was different. Aside from the viewing statistics that have already been covered in section 3.4.2, which clearly show the interest in the content of the videos, the Centre was informed by one of the interviewees of interest from the National Hydrological Project. A local NGO in Jharkhand also expressed keen interest and willingness to collaborate with another interviewee on the potential for local capacity building for soil moisture monitoring.

5. Lessons Learned and Future Recommendations

Over the 4 years during which the IUKWC was active, the Management Board and Secretariat learnt a number of lessons. The most obvious were that feedback gathered is extremely useful in improving the planning of the next events, and that having an honest and respectful team, where each member feels comfortable to share their views, makes working across large distances relatively simple. However, for the sake of similar endeavours in the future, the following key learnings and recommendations should be considered at inception for a successful programme:

- Networks such as the IUKWC, need long-term sustained funding to develop and strengthen as it takes time to establish the community. Mixed funding models could help;
- Involvement of an advisory group to include representatives from each target stakeholder sector can be beneficial to sustain relevance over time;
- While ongoing frameworks like the IUKWC provide valuable benefits in that they foster the development of ideas and partnerships outside of the time constraints of a funding call,





to realise these benefits research funders need to provide opportunities for project funding so that ideas can be developed into successful proposals, and collaborations strengthened. The time taken to turn the new ideas and partnerships that stem from such engagements into full research projects is directly dependent on the funding opportunities available, especially in the UK;

- Stakeholders should be looked at as co-creators of research. Funding call timescales can make this challenging. Mechanisms such as the GFES and UEI were found to be valuable and critical to embedding real change, and similar engagement opportunities should be part of future programmes so that baseline collaborations can be developed in preparation for funding opportunities;
- Developing successions of interlinked activities helps learning and capacity building - not only for early career researchers but for stakeholders as well; and
- Engagement should always be two way – for example - India has incredible start up culture and tech development that the UK HEIs/funders can learn from; and the UK have good basin management experience that India can learn from.

6. Conclusion

The IUKWC was a success in terms of meeting its overall aim of promoting cooperation and collaboration between NERC-MoES water security research in order to establish a platform for, and legacy of, long-term partnerships and dialogue between Indian and UK water researchers, water policy-makers and water businesses.

The Centre developed and successfully delivered a number of innovative engagement mechanisms that brought together a diverse and active community across the two countries. As well as supporting research-to-research engagement, the Centre developed successful initiatives that focused on connecting research with the end users of scientific advancements. Engagement with public sector was made possible through developing new innovative mechanisms and concerted efforts at national, state and local levels to reach out to stakeholders and get them engaged with the IUKWC. Furthermore, the IUKWC's innovative Grassroots programme enhanced researchers first-hand exposure to water challenges, laying the groundwork for better co-designed science projects.





Overall, the Centre clearly formed a platform for future collaboration & strengthened existing Indo-UK collaborative research. Feedback and subsequent proposals, papers and partnerships generated within the community highlight the benefits of such a platform. These collaborations will hopefully mature into joint projects and long-term personal and organisational linkages. As such, it is expected that the impact of the IUKWC on Indo-UK water science will continue to be seen for many years to come.



INDIA-UK
Water Centre
भारत-यूके
जल केन्द्र



Natural
Environment
Research Council



UK Centre for
Ecology & Hydrology



 @IndiaUKWater

www.iukwc.org

