Does South Asia need a regional dialogue on Open Science?

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Introduction

The Open Science movement aims to make scientific research more accessible, transparent, inclusive, and collaborative by removing barriers to access, sharing, and reuse. The open science movement has lately become integral in global science policy conversations as it has increasingly influenced how science is done. However, open science is perceived differently across various countries and regions due to their distinct S&T priorities and diverse stakeholders. Until recently, there was no unified definition of open science. For fair and equitable access for all, the need for a shared global understanding of the concept and opportunities of open science became imminent.

International organisations, such as the United Nations, the World Health Organisation, and UNESCO, have played a key role in promoting open science globally through science diplomacy efforts. They have been instrumental in raising awareness about the importance of open science as a tool for addressing global challenges, such as climate change, public health, and food security. The global open science movement further gained impetus with the launch of the landmark Budapest Open Access Initiative in 2002, which called for free access to research and knowledge for everyone, irrespective of their geographic location and financial resources. Furthermore, the Berlin Declaration on Open Access to Knowledge was issued in 2003, calling for open access to scholarly research. In 2016, a consortium of diverse stakeholders drafted the FAIR Guiding Principles for scientific data management and stewardship, intending to make scientific data more Findable, Accessible, Interoperable, and Reusable. A key output of such coordinated international

> "*Open science is defined as an inclusive construct that combines various movements and practices aiming to make multilingual scientific knowledge openly available, accessible, and reusable for everyone, to increase scientific collaborations and sharing of information for the benefits of science and society, and to open the processes of scientific knowledge creation, evaluation, and communication to societal actors beyond the traditional scientific community. It comprises all scientific disciplines and aspects of scholarly practices, including basic and applied sciences, natural and social sciences and the humanities, and it builds on the following key pillars: open scientific knowledge, open science infrastructures, science communication, open engagement of societal actors and open dialogue with other knowledge systems*."
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> UNESCO Recommendation Framework on Open Science in 2021

science diplomacy efforts was the UNESCO Recommendation Framework on Open Science in 2021. Signed by 197 countries, this framework provided an international standard for open science policy and practice that recognises diverse perspectives on open science across disciplines and regions.

Indeed, international cooperation and science diplomacy are at the core of the open science movement. They have enriched the movement by establishing networks, frameworks and recommendations that provide a solid foundation for open science practices. However, access to resources, research capabilities, socioeconomic conditions, policy environments and legal landscapes across countries affect the adoption and attitude towards open science. Therefore, among resource-constrained regions, such as South Asia, it becomes even more imperative to promote open science.

South Asia, consisting of eight countries - Afghanistan, Bangladesh, Bhutan, India, Nepal, Maldives, Pakistan, and Sri Lanka - shares a similar science and technology (S&T), economic, cultural and political landscapes. Establishing a regional open science network in this context can foster collaboration, knowledge sharing, and access to resources, data, and infrastructure. In this article, we explore the open science landscape in the South Asian region and emphasise the need for a regional open science network in addressing the unique challenges and requirements of this resource-constrained region.

Open Science Movement in Regional Context

While the core principles of open science are the same globally, the implementation of open science practices can vary across regions or countries depending on local factors and contexts, such as legal frameworks, funding structures, cultural norms, and infrastructure, that can influence the adoption and implementation of open science activities. For example, in some countries, there may be legal restrictions on data sharing, such as research or sensitive personal information. In terms of infrastructure, there may be differences in the availability and usage of digital platforms and tools for sharing and collaboration.

Under such scenarios, regional dialogues among neighbouring countries or regions that share similar economic, socio-political, and infrastructural strengths, such as the global South, can help to promote the open science movement by fostering collaboration, facilitating knowledge and resources sharing, and addressing common challenges related to open science practices. By engaging in regional dialogues, stakeholders can collectively develop policies and guidelines for data sharing and open access publishing. Furthermore, they can help in establishing robust digital infrastructure for effective data management and sharing and promoting awareness and adoption of open science practices among researchers and policymakers in the respective regions. There are a few existing models of such regional dialogues (Table 1).

Table 1: Examples of regional dialogue models on open science

Initiative	Description
Latin American Council of Social Sciences (CLACSO)	It is a regional network of social science research institutions and researchers in Latin America and the Caribbean. It actively promotes open science through its Open Science Program (CLACSO Books), providing training and resources and support for open access publishing, data sharing, and open educational resources. The program also focuses on developing digital infrastructure and establishing policies and guidelines for open science. Additionally, CLACSO hosts the Latin American Social Science Virtual Library (biblioteca.clacso.edu.ar), offering free access to a vast collection of open access social science research materials, enhancing the visibility and impact of research from the region.

Africa Open Science Platform (AOSP)	AOSP is an initiative established to advance open science practices and infrastructure throughout Africa. It aims to support the development of open science policies, capacity-building efforts, and digital infrastructure across the continent. Working groups and initiatives within the AOSP concentrate on various aspects of open science, such as open access publishing, data management, and open educational resources.
Red de Revistas Científicas de América Latina y el Caribe, España y Portugal (RedALyC)	The RedALyC is a regional network of scientific journals from Latin America, Spain, and Portugal. The network promotes open access publishing and works to increase the visibility and impact of scientific research from the region.
European Open Science Cloud (EOSC)	A key part of the European Commission's Open Science Agenda, EOSC is a pan-European initiative designed to provide researchers with access to research data and services. It is a federated infrastructure that brings together existing research data infrastructures across Europe. It serves as a single point of access for researchers, making it easier to find and use the data. In addition, it provides a range of services to support research, such as data management, analysis and visualisation. By enhancing access to research data, the EOSC promotes openness, transparency and inclusivity.
Forum for Open Research in MENA (FORM)	It is a non-profit membership organisation supporting the advancement of Open Science policies and practices in research communities and institutions across the Arab region. Founded in 2017 by a group of researchers and librarians from the Arab region, FORM aims to promote open science principles in the region. Its objectives include promoting open science policies and practices, facilitating collaboration among Arab region researchers, increasing the visibility and impact of research originating from the Arab region, and empowering citizens to participate in science and innovation.

Such initiatives have been crucial in propelling the open science debate and supporting the researchers in the respective regions. Considering the successes of such models, it becomes pertinent to explore whether similar approaches would be beneficial for South Asia.

Overview of South Asia's Open Science Landscape

According to a 2014 study, South Asia has shown tremendous growth in scholarly output and scientific publishing in the last 50 years.[1] South Asia further accounted for 5.3% of the global scholarly output in 2016.[2] Since then, several South Asian countries have undertaken initiatives to increase R&D[3], with India emerging as the world's third-biggest scholarly publishing hub.[4] However, despite the growing trend in science, technology and innovation (STI) measures, inter-regional collaborations to address regional challenges in South Asia are relatively rare.[5]

Given the constraints faced by developing South Asian countries, a significant number of resources are invested to produce scientific data and output. However, for optimum resource utilisation and to avoid reinventing the wheel, fostering scientific collaborations can benefit the region immensely. To aid such collaborations, each country in the region must adopt open science practices. However, before embarking

on this path, it becomes imperative to gain a comprehensive understanding of the region's attitude towards open science, existing policies, available resources and infrastructure.

We assessed the open science landscape in the region based on publicly available and accessible data (data from a few countries was either unavailable or limited). The overarching and common issues across South Asian countries include a lack of awareness regarding open science among researchers, funding agencies and policymakers, as well as the limited focus on the development of guidelines, frameworks, and infrastructure for open access publishing and data sharing. Although policy conversations have increased on open science in the wake of COVID-19, the overall state of the open science movement is still in a nascent stage. Below, we provide insights into the open science landscape of a few South Asian countries.

India

According to a 2018 report[6], the status of open science among researchers in India is concerning. Although most respondents (91.96%) agreed that open science is vital for research and that publicly funded research outputs should be accessible, only a limited fraction of them shared their publications (35.07%) and data (8.41%) through open access repositories. Even among those who use openly available publications and data, only a narrow percentage share them through open access, which is alarming considering that a significant proportion of respondents cited contributing to society and addressing social needs.

However, there has been a growing movement on open science in India, prompting the Government of India to act. The draft of the 5th national STI policy by the Indian Government includes recommendations on open science. The Indian open science framework aligns with global definitions, including UNESCO recommendations, while addressing local challenges.[7] It emphasises open access and sharing of publicly funded research data, along with region-specific requirements such as improved access to research facilities, libraries, and open educational resources. It also seeks to integrate science and society, recognise traditional knowledge systems, and encourage inclusive participation of stakeholders in scientific pursuits. Overall, the framework aims to create a more equitable and collaborative scientific ecosystem in India.

Pakistan

Similar to India, a survey conducted in 2017 painted a bleak picture of academic awareness and usage of open science resources in Pakistan.[8] Although a majority of Pakistani academics (71.5%) reported using open access to access scholarly knowledge, only a minority of them engage in publishing through open access platforms.

The Directory of Open Access Journals (DOAJ) recognises 50 gold open access journals in Pakistan, a product of longstanding open access initiatives such as Open Access Pakistan.[9] However, the open science debate in Pakistan is majorly limited to open access conversation, with limited attention given to other aspects such as open data, open source, and citizen science. Although, the scenario is rapidly changing after COVID-19 and through the efforts of international agencies[10], other aspects of open science are gaining recognition and importance in the national science policy discourse. However, it has yet to reflect as a priority in their national STI policy.[11]

Bangladesh

In Bangladesh, like India and Pakistan, there is limited literature on open science. A 2016 survey of the faculty of the University of Dhaka pointed to a lack of awareness about open access initiatives and a negative perception of open access journals.[12] However, this is little data and does not reflect the open science debate in its entirety in the country.

Efforts have been made to promote open access in Bangladesh. The International Network for the Availability of Scientific Publications initiated the BanglaJOL project in 2007, an online database of open access journals published in Bangladesh. DOAJ recognises 117 open access journals in Bangladesh, and

approximately five institutional repositories are hosting open access articles. In addition, Bangladesh is a beneficiary of the Research4Life initiative, which provides free or low-cost access to peer-reviewed articles to students and researchers in lower-income countries.

While the open science movement in Bangladesh has primarily concentrated on open access, there is a shift through emerging forums like Open Access Bangladesh, which actively promotes open research data, open source, and open educational resources.

Sri Lanka

The status of open science in Sri Lanka is currently in its early stages. While the government has shown some interest in promoting open science through initiatives like the National Science Foundation's Open Access Policy and provision for Open Education Resources[13], there is still a lack of awareness and understanding of open science among researchers and institutions.

A few researchers and institutions are promoting open science efforts, such as the University of Sri Jayewardenepura has established an open access digital repository for scholarly publications. However, broader institutional support and infrastructure are necessary to facilitate the widespread adoption of open science practices in the country.

Additionally, there is a lack of funding and resources for researchers to carry out open science practices, such as publishing in open access journals or depositing research data in open repositories. This poses a challenge to the growth of open science in the country. Despite some positive developments, Sri Lanka has yet to fully embrace and implement open science practices.

An Open Science Initiative for South Asia

In 1985, the South Asian Association for Regional Cooperation (SAARC) was established to promote cooperation among South Asian countries. A Technical Committee on S&T was set up to facilitate cooperation through joint projects, capacity-building programs, and the circulation of state-of-the-art reports on different S&T sectors. Despite this, regional dialogue and scientific cooperation remained abysmal, primarily due to financial constraints and political challenges.[14]

To overcome these limitations, India, as a prominent STI power and adopting a neighbourhood-first foreign policy[15], can potentially take the lead in the open science movement in the region. India is already host to several initiatives such as I-STEM, ITEC, SAU and CURE, which can facilitate regional cooperation and dialogue in open science. I-STEM serves as a national portal for open research infrastructure, allowing academic institutions, national labs, and strategic sector organisations to list their facilities and share them on a pay-per-use basis. CURE provides open access resources on COVID-19, including data and educational resources. South Asian University (SAU) brings together researchers, students and stakeholders from South Asia, while ITEC offers diverse training programs to foster greater cooperation between India and recipient countries. Among these, I-STEM and CURE are open science initiatives by design. SAU and ITEC programs provide unique opportunities to develop capacity-building, leadership, and open science networks in the region. However, none of these initiatives inherently promote open science within the countries or advance discussions on open science in science policy.

Recognising this gap, the Open Science South Asia Network (OSSAN; Figure 1) project was conceived to initiate the regional dialogue in South Asia. OSSAN aims to raise awareness about open science practices among South Asian researchers, identify common policy priorities among the participant countries: Bangladesh, India, Nepal, and Sri Lanka, and explore the feasibility of establishing such a network for collaboration in science.

As the project commenced, it became evident that open access publishing is a major thrust area of focus in this region. However, the open access publishing landscape varies across countries, making it difficult to identify overlapping policy priorities and interests. Nonetheless, there is a strong need for community



Figure 1. Open Science South Asia Network (OSSAN). (a) OSSAN Logo, (b) Online call for registration and participation in OSSAN 2022 conference, (c) OSSAN 2022 conference welcome note by Dr Akhilesh Gupta, Scientist-H, Department of Science & Technology and Additional Secretary, SERB, Govt of India – recording available on YouTube (d) OSSAN event on open innovation: From Science to Innovation, organised on 18 February 2023 at IISc Bengaluru (e) OSSAN Ideathon 2022 event: open source and open innovation ideas were invited from students (f) OSSAN partnered with NASTEC, Sri Lanka to deliver a workshop on scientometrics to early career researchers in Sri Lanka

building and raising awareness of open science practices. Developing open science infrastructures that would aid the entire region is vital. Furthermore, the development of alternative innovation metrics and the promotion of open-source innovation to address common social and technological challenges is imperative.

Experts unanimously agreed on the need for a dedicated forum for open science where scientists, academics, and policymakers can interact across borders. Such a network would represent the interests of South Asia on open science global forums. In addition, arduous labour is required to raise awareness about open science tools and practises among students, faculty, funding agencies and national journals.

A dedicated open science network in the region would address the barriers and challenges in adopting open science practices. However, past experiences, such as SAARC, have raised concerns over the success of such initiatives. To ensure the long-term sustainability of the network, it is recommended to secure adequate funding, implement a multistakeholder governance model, and seek support from international bodies like The World Academy of Sciences (TWAS) and the International Science Council (ISC).

Way Forward

Developing a dedicated open science network in South Asia can benefit this region by:

1. Building networks and communities: A regional dialogue could bring together researchers, institutions, and policymakers from different South Asian countries, enabling sharing of experiences, best practices, and challenges in open science. This could foster collaboration and innovation within the region.
2. Addressing regional challenges: The network could provide a platform for discussing and developing strategies to overcome challenges specific to South Asia, such as limited resources, infrastructure and awareness. The network can contribute to improving open science infrastructure, policies, and practices in the region, which could have positive ripple effects for the broader open science movement.

3. Enhancing capacity building: Through training programs and workshops, the network could enhance the skills and knowledge of researchers, students and professionals in open science practices, strengthening the capacity of the South Asian S&T ecosystem.
4. Advocating for policy reforms: The network could engage with policymakers and funding agencies to advocate for open science policies and influence policy reforms at the regional and national levels.
5. Raising awareness: By bringing together stakeholders from across the region, the network could raise awareness about the importance of open science and nurture a culture of openness, transparency, and collaboration within the South Asian S&T ecosystem.
6. Promoting resource sharing: The network could promote the sharing of research data, publications, and tools among institutions and researchers, overcoming resource limitations and facilitating more efficient and impactful scientific research.
7. Fostering international collaborations: Most importantly, this network could be a precursor to international collaboration by connecting researchers and institutions in South Asia with their counterparts in other regions. This can help to expand research networks, promote knowledge exchange, and encourage collaborative research projects that transcend geographical boundaries.

In summary, a dedicated open science network in South Asia could facilitate the open science movement in the region by fostering collaborations, addressing regional challenges, advocating for policies and practices, and building capacity and skills. Initiatives such as OSSAN are required to mature, become self-sustaining networks, and expand to other South Asian countries to bear the joint fruits of the regional open science movement.

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