



# SACEP-SANH 2ND SUB-REGIONAL WORKSHOP ON 'SOUTH ASIA NITROGEN FRAMEWORK POLICY' **WORKSHOP REPORT**

21 & 22 JUNE 2022 IN DHAKA, BANGLADESH

Nitrogen pollution is a significant issue globally and for South Asia. Human interventions, and the production of reactive nitrogen, are harmful to human health and the environment. This report gives an overview of the SACEP-SANH 2nd 'South Asia nitrogen framework policy' event, outlining key outcomes, and proposed next steps for further cooperation between scientists and policy makers. Links to workshop materials and resources are also provided.

By SANH and SACEP

August 2022

## TECHNICAL WORKSHOP OVERVIEW

This two-day technical workshop, focused on the science-policy interface around nitrogen issues in South Asia and at the national levels. Nitrogen pollution is a significant issue globally and for South Asia. Human interventions, and the production of reactive nitrogen (Nr), are harmful to human health and the environment. The South Asia Co-operative Environment Programme (SACEP) with the UKRI GCRF South Asia Nitrogen Hub (SANH), organised and held the workshop on the 21<sup>st</sup> and 22<sup>nd</sup> June 2022 in Dhaka, Bangladesh. The objectives of the workshop included:

- a) The release of the regional and national nitrogen policy reports marking a historic moment for South Asian cooperation to develop an evidence-based policy approach to tackle nitrogen pollution;
- b) To raise awareness and facilitate knowledge sharing on nitrogen impacts and policy interventions in South Asia to support the development and actions in the policy arena for nitrogen in South Asia.

One of the most pressing areas for action is the development of the regional roadmap on nitrogen for South Asia and the development of 'National Actions Plans' as called for in the UNEA5-2 latest resolution on sustainable nitrogen management. This workshop report gives an overview of the event programme, the participants, and key outcomes outlining proposed next steps as proposed, and how to further cooperation and links between science and policy. Access to related workshop materials, presentations and reports are also provided.

## UKRI GCRF SOUTH ASIA NITROGEN HUB (SANH) OVERVIEW



In a co-operative research programme on 'sustainable nitrogen management', the UKRI GCRF South Asian Nitrogen Hub (SANH) studies the impacts of reactive nitrogen pollution in eight countries: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. SANH brings together over 32 South Asian and UK institutions, including universities, institutes and NGOs, along with SACEP, to support progress towards meeting the Sustainable Development Goals (SDGs) by addressing the nitrogen challenge and building the scientific evidence base. This research programme aims to support efficient nitrogen use, reduce nitrogen waste, limiting the adverse effects on people and the environment. Reducing nitrogen waste would reap benefits to the air, water, land, seas, to human health, whilst ensuring food security and offering huge economic savings.

<https://sanh.inms.international/>

## SOUTH ASIA CO-OPERATIVE ENVIRONMENT PROGRAMME (SACEP) OVERVIEW



The South Asia Co-operative Environment Programme (SACEP) is an inter-governmental organization promoting and supporting environmental protection, management and enhancement in South Asia. Established by the governments of South Asia, SACEP works in areas where regional cooperation and collective action benefits member countries and produce better outcomes for the region. Since its creation, it has implemented several projects and programmes in the areas of environmental education, environment legislation, biodiversity, air pollution, and the protection and management of the coastal environment.

<http://www.sacep.org/>

## REPORT CONTENTS

RECAP: 1ST SACEP-SANH MEETING ON SUSTAINABLE NITROGEN MANAGEMENT p.3

LAUNCHING SACEP- SANH SCIENTIFIC REPORTS p.4

WORKSHOP PARTICIPANTS p.4

SACEP 2ND SUB-REGIONAL WORKSHOP ON 'SOUTH ASIA NITROGEN FRAMEWORK POLICY' OVERVIEW AND OUTCOMES p.5

DAY 1. WORKSHOP SUMMARY p.5

DAY 1. ROUND TABLE DISCUSSION OUTCOMES p.6

1. The most important scientific information that countries need to promote the nitrogen agenda
2. Suggestions on how SANH & SACEP can best share the nitrogen evidence with your governments and other stakeholders
3. Policy developments in the next ten years that have direct relevance to nitrogen
4. Current stand out policies relevant to nitrogen

DAY 2. WORKSHOP SUMMARY p.8

DAY 2. ROUND TABLE DISCUSSION OUTCOMES p.9

KEY CONCLUSIONS p.11

WORKSHOP RESOURCES p.13

APPENDIX

WORKSHOP PROGRAMME (DAY 1 & 2) p.15

INAUGURAL EVENT PROGRAMME p.15

CURRENT THINKING ON NITROGEN NATIONAL ACTION PLANS p.16

WORKSHOP PARTICIPANT DETAILS p.16

SANH PROJECT STRUCTURE p.19

ACKNOWLEDGEMENTS p.19

**The 1st Regional Nitrogen Framework Policy meeting** was held remotely, on 21st July 2020, by [South Asia Co-operative Environment Programme \(SACEP\)](#) and International Nitrogen Management System (INMS) - [South Asia Nitrogen Hub \(SANH\)](#). This meeting included government representatives from all eight South Asia countries: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. Country representatives presented on the current status of nitrogen use and issues, and related governance and policy in their countries.

During this meeting the importance of addressing the challenge of nitrogen pollution was emphasized given the nutrient effects within the terrestrial, marine and air environment. South Asia is a hotspot for many forms of reactive nitrogen ( $N_r$ ) pollution. Regional action was highlighted as crucial for nitrogen management as nitrogen pollution does not respect national boundaries, moreover with the rapid growth of pollutants these cannot be handled on a single country basis.



**Meeting delegates at the Global nitrogen campaign launch, Colombo, Sri Lanka 23-24<sup>th</sup> October 2019, Photograph UNEP**

Progress is being made. Reducing nitrogen waste is possible and highly desirable because it can increase efficiency as well as decreasing undesirable environmental effects. Mitigating those threats needs trans-boundary, coordinated responses as well as inter-sectoral collaboration, because of the varied sources of nitrogen waste. The [Colombo Declaration in 2019](#), set out the aim to halve nitrogen waste by 2030 through the development and implementation of policies addressing nitrogen pollution. SACEP with SANH is working to encourage the development of a regional nitrogen road maps and National Action Plans as advocated for in international agreements. SANH provides an ideal forum for connecting South Asia and the UK together to provide guidance on the South Asia Framework policy on Nitrogen management.

**This 2nd Regional Nitrogen Framework Policy hybrid event held in June 2022**, builds on the 1<sup>st</sup> regional event. During this two-day technical workshop scientific findings from SANH nitrogen emission and policy status assessments were disseminated, focusing on the regional and country level. In addition round table discussions helped country representatives to share experiences, outline barriers and opportunities, and discuss potential ways forward.



**SACEP-SANH 2nd Regional Nitrogen Framework Policy technical workshop, Dhaka, Bangladesh, Photograph SACEP**



## LAUNCHING SACEP- SANH SCIENTIFIC REPORTS

In the 2<sup>nd</sup> regional workshop two key scientific reports were officially launched:

- [Nitrogen Pollution in South Asia: Scientific Evidence, Current Initiatives and Policy Landscape](#) (SACEP-SANH 2022). This report is a major collaborative output by SACEP and SANH.
- [Bangladesh Nitrogen Policy Report: Scientific Evidence, Current Initiatives and Policy Landscape](#) (Shifa et al. 2022). The national policy report for Bangladesh was written by SANH scientists from Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU).

Further national reports detailing the status of policies dealing with nitrogen pollution, the sources and trends have also been completed by Nepal and Sri Lanka, so to be released. Additional national level reports for India, Maldives, Pakistan, and Afghanistan are still in development. The key findings from these reports were shared in the workshop.



Front covers of the regional SACEP-SANH (2022) nitrogen policy report and the Bangladesh nitrogen policy report (Shifa et al. 2022)

## WORKSHOP PARTICIPANTS

The workshop was attended by **nine government representatives** from five South Asia countries (Bangladesh, India, Maldives, Nepal, and Sri Lanka). From SACEP, the intergovernmental body and organiser, **the Director-General Dr Md. Masumur Rahman and Programme officer** attended. From SANH, the co-organiser of the event, the scientific community was represented, consisting of **over 20 SANH scientists**, with several joining online including the project leader **Prof Mark Sutton**, and **Prof Nadula Raghuram**. All those attending the technical workshop were active participants, representing the countries of South Asia and the UK (see appendix for a list of participants).



Technical Workshop discussions, Photograph SACEP

## SACEP 2ND SUB-REGIONAL WORKSHOP ON 'SOUTH ASIA NITROGEN FRAMEWORK POLICY' OVERVIEW AND OUTCOMES

The full workshop programme for day 1 and day 2 can be found in the appendix (p.15), including an overview of the inaugural report launch event programme. The following sections summarise the main workshop content and discussion outcomes.



South Asia Country governments represented at the workshop, Photograph SACEP

### DAY 1. WORKSHOP SUMMARY

The first half day of the workshop was focused on the **scientific evidence on nitrogen** and its *importance to life on earth* and food security, but also the negative impacts globally and regionally in South Asia (please see report for more details [SACEP-SANH, 2022](#)). The role of SACEP and SANH was outlined.

The South Asia region was highlighted, with scientific evidence, as a **global reactive nitrogen (N<sub>r</sub>) hotspot**. The negative consequences of nitrogen waste to air quality, water quality, and human health amongst other aspects were outlined.

SANH scientists introduced the scientific approach taken by SANH, with an overview on methods, data, and the key findings on nitrogen emissions trends, and nitrogen related policy (See [SACEP-SANH 2022 regional policy report](#)) and related published scientific papers. The morning session was concluded by an overview into the SANH stakeholder analysis approach, emphasising why a wider recognition and engagement with stakeholders is beneficial to nitrogen management and policy development (Das et al., 2022).

In the second half of the day presentations were provided for 6 countries including Bangladesh, Sri Lanka, India, Nepal, Maldives and Pakistan. **SANH scientists presented on the key findings from national level scientific assessments** outlining:

- 1) The nitrogen issues in the country, and nitrogen emission trends, indicating that for all countries emissions have been rising over the last four decades;
- 2) The policy analysis results focused on sinks, sectors, and other characteristics;
- 3) Key nitrogen related policies were highlighted;
- 4) Key recommendations and considerations were provided.

The country level results presented can be found in the full national reports available for Sri Lanka ([Nissanka et al., 2022](#)), Bangladesh ([Shifa et al., 2022](#)), and Nepal ([Joshi et al., 2022](#)), and for other countries these are under development. Summary documents synthesising the key results and recommendations for each country on nitrogen policy and emission are available for Sri Lanka, Nepal, Maldives, India, Afghanistan, and Pakistan (see Resources p.13 for more details).

## DAY 1. ROUND TABLE DISCUSSION OUTCOMES

One of the most valuable aspects of the technical workshop were the round table sessions. These enabled knowledge exchange between the government representatives and the SANH scientists and other participants. There were four breakout groups and questions were provided and directed towards the government representatives. The discussion outcomes are outlined below.

### 1: THE MOST IMPORTANT SCIENTIFIC INFORMATION THAT COUNTRIES NEED TO PROMOTE THE NITROGEN AGENDA

- It was noted that **updated and reliable emissions inventories for all reactive nitrogen compounds, for all the eight South Asian countries, for sources, and sinks, would be important.**<sup>1</sup> Nitrogen emission data is available via [EDGAR](#), a dataset on global emissions used by SANH, at large temporal and spatial scales to provide evidence that can support governments to understand past and present N<sub>r</sub> emission flows and develop future scenarios.
- The **Nationally Determined Contributions (NDCs)**<sup>2</sup> are a key assessment taken nationally, and recently updated, and can help guide and further promote the nitrogen agenda. Nitrous oxide (N<sub>2</sub>O) a greenhouse gas (GHG) has been increasing in the region major sources include agriculture, industry and energy, amongst other sources (Bansal et al. 2022, SACEP-SANH 2022).
- In Bangladesh there is national level data on GHG emission available up to 2012. It was noted that there would be concerns/lack of confidence about other sources of emission data, such as the quality of EDGAR data. That said it was acknowledged that nitrogen emissions are increasing and action is needed.
- There are **some nitrogen targets already in place**, in the case of Bangladesh these include targets for Nitrous oxide (N<sub>2</sub>O). There are also standards set for NO<sub>x</sub> and monitoring stations reveals that the limits have remained below the limits. In addition, nitrates are monitored in the water systems.
- There are **collaborative initiatives and data collections, relevant to nitrogen already in place**. For example in Bangladesh, the Department of Environment is working with the Norwegian Institute for Air Research (NILU). NILU has a project in Bangladesh focusing on emissions and air quality studies in the capital city Dhaka, as well as in the city Chittagong.



Workshop round table discussions, Photograph SANH

### 2: SUGGESTIONS ON HOW SANH & SACEP CAN BEST SHARE THE NITROGEN EVIDENCE WITH YOUR GOVERNMENTS AND OTHER STAKEHOLDERS

- Through organizing **meeting, workshops, seminars, conferences in person or virtually. As a stakeholder, ministry person/ NFPs of each country can be contacted formally mentioning SANH as a multilateral project involving SACEP.**
- One of the **main issues is the lack of awareness of the general public and the government about the issue of nitrogen.** For the national government, In Bangladesh it was reported that nitrogen is not a high priority but climate change action is, therefore strengthening the link/awareness of climate actions and nitrogen mitigation actions would be helpful.
- **Social media was recommended as the best approach for increasing public awareness** on the issues and solutions on nitrogen and not necessarily the newspapers.

<sup>1</sup> Emissions Database for Global Atmospheric Research (EDGAR) N<sub>2</sub>O data is now available up to the year 2020 for NH<sub>3</sub> and NO<sub>x</sub> it is available until 2015. See <https://edgar.jrc.ec.europa.eu/>

<sup>2</sup> Each country to outline and communicate their post-2020 climate actions to reduce national emissions and adapt to the impacts of climate change as part of the UNFCCC the Paris Agreement.



- **Highlighting the economic savings and/or impacts on health could help to bring about behavioural change and lead to more efficient nitrogen use by the public.** For example, emphasising how much money could be saved by improving nitrogen use efficiency and via certain measures especially at a local/individual level. An example was provided of a farmer-scientist workshop where the benefits of improving nitrogen use efficiency (NUE) were demonstrated along with the savings they would make in local currency (Dhaka) to their own income (monthly/annual). This was indicated to be a powerful approach. Such demonstrations and awareness building would be key communication tools that will appeal to local farmers.
- A respondent noted that a barrier to action could be a distrust towards scientists. **The public would more readily accept information if it goes through the government, in particular via agricultural extension staff. Awareness raising and training is needed to dispel misconceptions farmers have.** for example that more is better in terms of (fertilizer) inputs and the greener the field better the crop, when in reality these could be indicators of low NUE, therefore creating an economic loss, and contributing to N pollution (that would impact local water and air quality).

### 3: POLICY DEVELOPMENTS IN THE NEXT TEN YEARS THAT HAVE DIRECT RELEVANCE TO NITROGEN

For India several policy developments were outlined, including policies to deal with urban nitrogen air pollution due to road transport. The **National Electricity Mobility Mission Plan of India, 2020** (MoHIPE 2020) is one of the more recent Indian policy developments under which electric vehicles have entered the market and can be seen on the roads of metropolitan cities like Delhi. Though initially, the number of electric vehicles is low, if this initiative is promoted on large scale in the next ten years, it could directly reduce the  $N_r$  emissions particularly nitrogen oxides ( $NO_x$ ) and Particulate Matter ( $PM_{2.5}$ ) in urban centres of India.

In Bangladesh, the country has achieved capacity for energy, but demand is estimated to rise, and the current goal is to double energy provisions in the country. The Government, it was reported, intends to achieve these goals by shifting to coal and not renewables, which will have impacts on climate change and also excess  $N_r$  pollution. In addition, natural gas is heavily relied upon for heating (home cooking) in homes outside Dhaka and is also used for vehicles.

Concern and attention is needed on how to address nitrogen oxides ( $NO_x$ ) emissions increases from the transport and energy sector as key sources. An issue with vehicle compliance on emissions is that compulsory annual vehicle checks are not reliable. These are often paid for but in practice fumes/emissions from those vehicles are not actually checked. Therefore, it was noted that “once a car enters it never dies” in that despite dangerous emissions and age of vehicle it will tend to stay on the road.



Prof. Tapan Adhya presenting on nitrogen issues in South Asia, Photograph SACEP



#### 4: CURRENT STAND OUT POLICIES RELEVANT TO NITROGEN

There are several policies in India that were noted for standing out due to their nitrogen relevance. These include:

- **National Environment Policy (2008):** It is relevant to nitrogen as it regulates the use of environmental resources to prevent leakage of N in various environmental sinks like air, water and soil. It integrates environmental concerns with economic and social development projects.
- **National Policy on Reuse of Treated Water (2017):** It promotes the use of treated waste water for non-potable uses like toilet flushing, car washing, horticulture, lake revival etc. It aims to control the loss of reactive nitrogen to water bodies that are often added via untreated sewage or partially treated waste water.
- **Atal Mission for Rejuvenation and Urban Transport (AMRUT-2015):** This policy could reduce the nitrogen pollution to water by providing access to the sewerage and septage management to households, providing clean tap water. It can reduce nitrogen air pollution by promoting non-motorized transport for public and at construction facilities in urban India. This policy has the potential to create positive outcomes for citizens, particularly women, and indicators and standards have been prescribed by the Ministry of Housing and Urban Affairs (MoHUA) in the form of Service Level Benchmarks (SLBs).
- **National Mission for Sustainable Agriculture (2010):** It has been formulated for increasing agricultural productivity in rain-fed areas by focusing on integrated farming, water use efficiency, soil health management and synergizing resource conservation. Therefore, it aims to help to reduce the soil nitrogen pollution via soil test based application of macro & micro nutrients and development of soil fertility maps to facilitate judicious use of fertilizers.
- **National Energy Policy (Draft-2017):** This policy plays a vital role in controlling the release of N<sub>r</sub> compounds into the air as renewable energy and aims to reduce the dependence on fossil fuels to provide the national energy security.

Policy examples for Bangladesh:

- All new housing developments in Bangladesh are required to get approval from the authorities, and are required to have solar energy in an effort to encourage renewable energy use for households. It was reported in discussions, however, that the technology is not up to standard. Therefore, often these solar panels fail after a short time and people have to resort to fossil fuel energy. There is also the added problem of disposal of the lithium batteries which is a major environmental hazard.
- In terms of environmental policies, the '**Environmental Conservation Rules (1997)**' was recently amended and this has the potential, once approved, to strengthen pollution control rules.
- The 'Biodiversity framework policy' also provides crucial guidelines relevant for nitrogen management.

Policy examples for Nepal:

- **National Environment Policy, 2019;**
- **Environment Protection Act, 2019;**
- **Agriculture Development Strategy, 2015-35**

#### DAY 2. WORKSHOP SUMMARY

In the morning of the second workshop day, in the presence of Bangladesh ministers and senior civil servants, the two reports were launched: the SACEP and SANH regional policy report (SACEP-SANH 2022) and the national policy report for Bangladesh (Shifa et al. 2022).

This event was attended by special guests who gave speeches on nitrogen from the perspective of different ministers and ministries in Bangladesh and from the Ministry of Environment from Sri Lanka (see list of speakers on p.15). Professor Mark Sutton, a leading nitrogen scientist and the project leader of SANH, provided an



**SACEP 2nd regional workshop Regional policy report launch, Photograph SANH**

overview of nitrogen issues globally and for South Asia, highlighting the progress in policy and research that has been made regionally and setting out what still need to be done.

The technical workshop resumed later that morning and included speeches and presentations from a range of participants including a national Civil Society Organisation (CSO) perspective on nitrogen, and those of an ex-government official. This was then followed by a presentation on the international policy developments in relation to the United Nations Environmental Assembly (UNEA) sustainable nitrogen resolutions and the roadmap to UNEA6 in March 2024. This was then followed by an overview into the latest thinking and guidance on National Action Plans on sustainable nitrogen management.

## DAY 2. ROUND TABLE DISCUSSION OUTCOMES

**The afternoon was dedicated to roundtable discussions focused on the development of nitrogen National Action Plans.** Following the Colombo Declaration (2019) and the latest UNEA 5.2 nitrogen resolution (adopted in 2022) the development of 'National Action Plans' to stimulate sustainable nitrogen management are encouraged. Three discussion groups were formed mixing together government representatives and respective country SANH scientists in order to share lessons and feedback between countries. The groups were asked to discuss the following four questions in regards to the formulation of nitrogen 'National Action Plans': 1) *What is needed?* 2) *What are the limitations/barriers?* 3) *Any suggestions for improvements (on the national action plan template see Appendix Table 1 )?* 4) *What can be the immediate next steps?*

Discussion points from certain countries (Maldives, Sri Lanka, and India) are summarised below followed by overall conclusions from the workshop.

### MALDIVES:

#### What's needed?

- A steering committee with related stakeholders needs to be established.
- Action plans will require targets to achieve.
- Requires a document giving the baseline situation and evidence to help policy makers identify gaps. In addition, guidance and recommendations in the report.
- The development of an Action Plan requires stakeholder engagement and consultation and the final version would be ratified by the president with Ministry of Environment.
- A key priority is raising the awareness of the general public on the health and environmental impacts of nitrogen waste.

#### Limitations

- Current reliance on import fuel/diesel and barriers to solar.
- Lack of awareness

#### Next steps

- The draft of the Maldives national policy report will be circulated and shared for wider stakeholder consultation at multiple levels.
- Need to create awareness via a communication campaign for the public and farmers (e.g. use of colour charts).
- Incentives are needed to change practice such as for composting. There is a need to create a market also to encourage use of home gardens and producing own food - waste management is a key issue i.e. how to handle food waste, a few islands are doing this already but most lack capacity.

### SRI LANKA

#### What's needed?

- Sri Lanka has an inter-ministerial committee on nitrogen, that included multiple ministries, but this has been dormant since 2019, a key next step would be to reactivate this group.
- There is a need to stock take and have a symposium on nitrogen in Sri Lanka. This would also feature the policy analysis research to highlight the gaps in policy and in research.
- Lead proposals for research funding to fill research gaps

#### Next steps

- A transition was needed and not an immediate change. This advice was ignored previously and contributed to food security issues in the country.
- A barrier in science-policy communications was highlighted when the former government set a ban to halt imports, and use, of synthetic fertilizers against the advice of the scientists.

### INDIA

#### What's needed?

- It can utilize the SANH evidence on policies (via the open access [SANH policy database](#)).
- Aim to try to understand what impact those policies are really having on nitrogen management
- Take stock of all sectors including transport and agriculture and their contributions to nitrogen emissions.
- It's important to stop leakage - e.g. actions to mitigate in one area lead to emissions/waste in another.
- India currently has 40% renewables and aims to be at 70% by 2030 (Source to check).
- Replacing food production with natural alternatives is possible in some parts but not for all production.
- In raising awareness emphasis should not be about removal but about reducing losses.

#### Limitations

- Energy: coal based power stations are a priority area and there are standards for chimneys on NO<sub>x</sub>, as a point source, – 70% of these stations are ran by state governments but additional public investments is needed for stations to meet environmental standards.

- With a growing economy and development there is always pressure on land leading to increased inputs.

#### Next steps

- Prepare a National Action plan.
- Emphasis is needed to increase available solutions e.g. highly efficient fertilizers and technology sharing.
- Having pilot case studies as examples of what changing practices could achieve would help to raise awareness and demonstrate benefits.
- It's important to educate and train staff especially agricultural extension staff and at different scales (national, province, local).

### KEY WORKSHOP CONCLUSIONS

- i. There was a general **consensus that National Action Plans (NAPs), as advised under the UNEA5-2 resolution, were needed.**
  - The draft template outlined (see Appendix Table 1 for outline, p.16) was agreed to be a good place to start.
  - Lessons from other existing National Actions Plans such as those on air quality (in Maldives) and the Nationally Determined Contributions (NDCs) addressing Greenhouse Gases (GHGs) can also inform a new Action Plans.
  - Amendments in existing policies, to consider measures for mitigating nitrogen pollution, could also be considered.
- ii. **National action plans for sustainable nitrogen management should:**
  - Be feasible and practical;
  - Include measures to address and mitigate nitrogen waste;
  - Include country level targets and indicators to measure progress, based on baseline evidence at the country level (such as provided by the SANH-SACEP national and regional reports);
  - Be guided by the scientific evidence;
  - Have stakeholder involvement at every stage. Therefore, a complete stakeholder assessment & mapping – define roles & responsibilities is needed (Sector specific analyses are underway by SANH);
  - Align with local implementation plans;
  - Local action plans may also be appropriate.
- iii. **Working groups and/or inter-ministerial nitrogen committee at the national levels were acknowledged as necessary.** Such groups are currently in various states across the South Asia countries, and in most countries these have yet to be established. It was noted that such groups should include:
  - Multi- stakeholder forums government and departments, NGOs and private sector amongst others, and involve multi levels (national – local). Stakeholder integration between departments and ministries to form a national nitrogen committee to connect concerned departments within ministries.
  - Coordination between key stakeholder agencies is crucial (central and local Government, NGOs) and stakeholder identification. This will reduce the knowledge gaps between institutions.
  - The formulation of these groups could ideally be informed by stakeholder assessments and wider involvement at the early stages which could support better coordination amongst the institutions.
  - A regulatory body is required.





SACEP-SANH 2nd regional workshop group discussions, Photograph SANH

iv. **Raising awareness both within government and with the general public was recognised as a high priority.** In some cases very little is known, if anything, about nitrogen issues in the countries and at a local level.

- A communication strategy/ campaign was identified as a 'necessity' to raise awareness of the issues but also the solutions. As one person noted the message should not be about taking away but about reducing in many cases.
- A communications plan should detail who are the stakeholders, key activities to implement with information and messages (to deliver), tools / materials to use, implementation schedule and a monitoring and evaluation plan.
- Simplification of messaging from national to individual level is required.
- There should be an aim to conduct meetings and/ or workshops to discuss what could be done at the national level in line with the National Plans for Sustainable Development Goals (SDGs) and other specific National Plans.
- Inform and engage the farmers via meetings, and the use of media (traditional & social media).



SACEP-SANH 2nd regional workshop group discussions, Photograph SANH

- v. **Gaps in research were also noted as an issue, such gaps need to be identified and capacity improved by available funding.** Having rigorous, reliable and locally relevant research, and science to support policy decision-making was seen as a crucial element. In addition, building and fostering communication, links and exchange between policy and science was necessary. SANH and SACEP have a clear role in this area.
- vi. **Opportunities were identified within each country on where improvements and solutions were needed in particular sectors such as transport, waste management, agriculture and energy.** There are still a number of barriers and limitations that reflect information gaps, lack of coordination between relevant institutes, as well as technological and financial aspects. Other limitations include:
  - o Non-existence and/or lack of (traditional) knowledge transfer on nitrogen efficient approaches;
  - o Disconnect between science and policies;
  - o Lack of Expertise/ experts in the required field;
  - o Lack of coordination amongst institutions;
  - o The need to be ready/ or readiness to adapt may be a challenge and agents are needed to facilitate this.
- vii. **Immediate next steps** were that the national focus points were keen to report back the workshop outcomes to their respective ministries and departments, especially action to formulate (or reactivate) nitrogen working groups and/ or commissions.

**In conclusion SACEP and SANH are continuing to support the regional national governments of South Asia to take these steps in order to move the nitrogen agenda forward** which in effect will save lives, save money, and minimise the harmful environmental impacts, by finding workable solutions to the nitrogen crisis.

FOR FURTHER INFORMATION DETAILS PLEASE CONTACT:

SANH Senior Research Fellow: Anastasia Yang [anastasisa.yang@ed.ac.uk](mailto:anastasisa.yang@ed.ac.uk)

SACEP Programme officer: Priyankari Alexander [priyankari.alexander@sacep.org](mailto:priyankari.alexander@sacep.org)

## WORKSHOP RESOURCES

### REGIONAL REPORT

SACEP & SANH (2022) South Asian Regional Cooperation on Sustainable Nitrogen Management, Nitrogen Pollution in South Asia: Scientific Evidence, Current Initiatives and Policy Landscape, SANH Policy Paper PP1, Colombo & Edinburgh <https://sanh.inms.international/publications/SACEPSANHPolicyReport>

### REGIONAL NITROGEN POLICY BRIEF

Yang A.L, Adhya, T.K., Anik, A.R., Bansal, S., Carnell, E., Chowdhury, S., Das, S., Hassan R., Jayaweera, A., Jeffery R., Joshi, R., Kaushik, H., Khaleel, Z., Nayak, D., Nissanka, S., Panda, A., Pokhrel, A., Porter, S., Raghuram, N., Safi, Z., Sharmin, S., Sharna, S.C., Shazly, A., Sutton, M.A, Tomlinson, S., Tshering, D., & Watto, M.A. (2022) South Asian Regional Cooperation On Sustainable Nitrogen Management Nitrogen Pollution and Policy Responses in South Asia, South Asia Co-operative Environment Programme (SACEP) and the UKRI GCRF South Asian Nitrogen Hub (SANH) Policy Brief.

<https://sanh.inms.international/publications/nitrogenpollutionandpolicy>

### NATIONAL REPORTS

Joshi R., Shrestha, R., Pokharel A., Yang A.L. (2022) Nepal Nitrogen Policy Report: Scientific Evidence, Current Initiatives and Policy Landscape, SANH Policy Paper, Kathmandu.

<https://sanh.inms.international/sites/default/files/2022-06/Final%20SANH%20policy%20report%20Nepal%20June%2015.2022.pdf>

Nissanka, S.P., Jayaweera, A., Yang A.L. (2022) Nitrogen Policy Report: Sri Lanka, South Asia Nitrogen Hub (SANH), Peradeniya, Sri Lanka, and Edinburgh, UK; <https://sanh.inms.international/sites/default/files/2022-06/Report%20Final%20SL.pdf>

Shifa, S., Yang, A.L., Anik, A.R., (2022) Bangladesh Nitrogen Policy Report: Scientific Evidence, Current Initiatives and Policy Landscape, SANH Policy Paper, Gazipur;  
[https://sanh.inms.international/sites/default/files/2022-06/SANH%20report\\_BD\\_final.pdf](https://sanh.inms.international/sites/default/files/2022-06/SANH%20report_BD_final.pdf)

**NOTE:** POLICY REPORTS FOR INDIA, PAKISTAN, MALDIVES, AND AFGHANISTAN ARE UNDER DEVELOPMENT

#### NATIONAL LEVEL SUMMARY DOCUMENTS

Azhar A., Yang A.L. (2022) Pakistan Nitrogen Policy Report Summary: Policy Focus, Scientific Support and Current Interventions, Summary policy report, UKRI GCRF South Asian Nitrogen Hub (SANH)

Joshi R., Shrestha, R., Pokharel A., Yang A.L. (2022) Nepal Nitrogen Policy Report Summary: Scientific Evidence, Current Initiatives and Policy Landscape, Summary policy report, UKRI GCRF South Asian Nitrogen Hub (SANH)

Shazly, A., Fathimath, F., Ahmed, Z., Jeffery, R., Yang A.L. (2022) Maldives Nitrogen Policy Report Summary: Scientific Evidence, Current Initiatives and Policy Landscape, Summary policy report, UKRI GCRF South Asian Nitrogen Hub (SANH)

Nissanka, S.P., Jayaweera, A., Yang A.L. (2022) Sri Lanka Nitrogen Policy Report Summary: Scientific Evidence, Current Initiatives and Policy Landscape, Summary policy report, UKRI GCRF South Asian Nitrogen Hub (SANH)

Yang, A.L. (2022) Afghanistan Nitrogen Policy Report Summary: Scientific Evidence, Current Initiatives and Policy Landscape, Summary policy report, UKRI GCRF South Asian Nitrogen Hub (SANH)

#### STAKEHOLDER ANALYSIS SUMMARY REPORT

Das, S., Tyagi, N., Choubey, S., Jeffery R. Yang A.L. (2022) Barriers and Challenges to effective Nitrogen Management: Stakeholder Analysis of Agriculture Policies in India. SANH report, India.

#### JOURNAL PAPERS

Yang, A.L., Raghuram, N., Adhya, T.K., Porter, S.D., Panda, A.N., Kaushik, H., Jayaweera, A., Nissanka, S.P., Anik, A.R., Shifa, S. and Sharna, S.C. Joshi, R., Arif Watto, M., Pokharel, A., Shazly, A., Hassan, R., Bansal, S., Kanter, D., Das, S. & Jeffery, R. (2022) **Policies to combat nitrogen pollution in South Asia: Gaps and opportunities**, Environmental Research Letters, <https://doi.org/10.1088/1748-9326/ac48b2>

Bansal, S., Raghuram, N., Adhya, T.K., Rahman, M.M., Tshering, D., Dahal, K.R., Wakeel, A., Aminath, S., Safi, Z., Nissanka, S. and Pathak, H., Aziz, T., Naher, U. A., Dandeniya, W., Biswas, J.C., Taneja, J., Panda, A.N., Kaushik, H., Jain, N., Skiba, U., Ramachandran, R. & Sutton, M.A. 2022. **Long-term trends of direct nitrous oxide emission from fuel combustion in South Asia**. Environmental Research Letters, 17(4), p.045028.  
<https://doi.org/10.1088/1748-9326/ac5cf7>

## APPENDIX

### WORKSHOP PROGRAMME

#### DAY 1 workshop programme

<b>09:30-13:00</b>	<p>Opening of the meeting Chair: DG SACEP</p> <p>Welcome from SACEP: DG SACEP</p> <p>Welcome from SANH: Why Nitrogen?: Prof Tapan Adhya</p> <p>Welcome from BSMRAU: Prof Mizanur Rahman</p> <p>Plan of the two days: Prof Roger Jeffery</p> <p>Discussions on the Technical Session to Explain the Underlying Principles and Key Issues in the Report. Chair: Roger Jeffery SANH</p> <p>Key aspects of SANH science: Tapan Adhya</p> <p>Data sources: Dali Nayak</p> <p>Why collect policy data?: Roger Jeffery</p> <p>How did we collect and analyse the data?: Annie Yang</p> <p>Key results and desired outcomes from the exercise: Raghuram (via video-link)</p> <p>How policy analysis fits into the rest of SANH activities: Mark Sutton (via video-link)</p> <p>Stakeholder analysis: Smriti Das</p>
<b>14:00-16:00</b>	<p>Country Presentations for SACEP Member States, presented by SANH Country Members</p> <p>Chair: Prof Mizanur Rahman</p> <p>Bangladesh: Sharmin Shifa</p> <p>Nepal: Rajendra Joshi</p> <p>Sri Lanka: Sarath Nissanka</p> <p>Maldives: Zameela Ahmed</p> <p>India: Ananta Narayan Panda</p> <p>Pakistan (via video-link): Azhar Abbas</p>
<b>16:00 – 18:00</b>	<p>Round table discussions on nitrogen policy developments, stakeholder engagement, and science–policy knowledge sharing.</p>

#### DAY 2 workshop programme

<b>9:00 -10:30</b>	<p>Official Launch of the regional policy report and the Bangladesh national report; Inauguration event</p> <p>Chief guest: Dr. Muhammad Abdur Razzaque MP, Minister, Ministry of Agriculture, Bangladesh</p> <p>Chair: Dr. Md. Masumur Rahman, Director General of the South Asia Cooperative Environment Programme (SACEP)</p> <p>Special Guest:</p> <ul style="list-style-type: none"> <li>- Habibun Nahar M.P., Deputy Minister, Ministry of Environment, Forest and Climate Change, Bangladesh</li> <li>- Mr. Masud Bin Momen, Senior Secretary, Ministry of Foreign Affairs, Bangladesh</li> <li>- Dr. Anil Jasinghe, Secretary of Environment, Sri Lanka</li> <li>- SANH Project brief: Prof. Dr. Mark Sutton (via video-link), UK</li> <li>- Welcome speech: Prof. Dr. Mizanur Rahman, Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Bangladesh</li> </ul>
<b>11:15-13:00</b>	<p>Discussion on regional nitrogen Policy Roadmap: National Responses Chair: DG SACEP</p> <ul style="list-style-type: none"> <li>- Prof Dr Hosne –Ara Begum, TMSS socio-economic development organization, a Civil Society Organization perspective on nitrogen in Bangladesh.</li> <li>- Md. Mustafizur Rahman Akhand, Ex-Deputy Director (Lab), Dhaka Laboratory Department of Environment, Government of Bangladesh.</li> <li>- SACEP and SANH's role in nitrogen action, Dr. Md. Masumur Rahman SACEP Director General, South Asia</li> <li>- Global initiatives and current thinking on nitrogen roadmaps – Professor Mark Sutton (via video-link)</li> </ul>



	<ul style="list-style-type: none"> <li>- Current thinking on nitrogen National Action Plans – Dr Annie Yang/Dr David Kanter</li> </ul>
<b>14:00-16:00</b>	<p>Round table discussions on the development of national action plans Chairs: DG SACEP and Prof. Rajendra Joshi, SANH</p> <p>Round table discussions on national action plans</p> <ul style="list-style-type: none"> <li>- What is needed?</li> <li>- What are the limitations</li> <li>- Any suggestions for improvements?</li> <li>- What can be the immediate next steps?</li> </ul> <p>Output: Summary report of proceedings, e-copies of all documents, photos, videos for SANH and SACEP websites.</p>

## CURRENT THINKING ON NITROGEN NATIONAL ACTION PLANS

National Action Plans (NAPs), are advised under the UNEA5-2 resolution, adopted in March 2022. In an international workshop held in 18 -20th May 2022, organised by David Kanter (NYU) Wilfried Winiwarter (IIASA) funded by OECD, INMS, IEA, an international and interdisciplinary audience of scientists, policy makers and United Nation representatives were brought together, to explore and propose a coherent approach for developing national roadmaps for sustainable nitrogen management and the development of nitrogen National Actions Plans. Table 1 provides the draft template for National action plans proposed in the workshop. A more detailed National Action Plan template is in development by Kanter et al. (2022).

**Appendix Table 1. National Action Plan template (in development by Kanter et al)**

<b>Pre-action plan activities</b>	<ul style="list-style-type: none"> <li>- Identify a lead body and coordination structure</li> <li>- Engage broad spectrum of stakeholders</li> <li>- Take stock of current national situation in terms of N flows, budgets and governance</li> </ul>
<b>Strategy</b>	<ul style="list-style-type: none"> <li>- Long-term vision for N management</li> <li>- Select priorities for timespan of action plan</li> <li>- Develop targets backed up by trustworthy indicators and justifiable baselines</li> </ul>
<b>Actions</b>	<ul style="list-style-type: none"> <li>- What specific activities will help you achieve targets?</li> <li>- How will responsibility for achieving these targets be shared across sectors/sub-nationally?</li> <li>- How can targets be mainstreamed across different national objectives to minimize trade-offs?</li> </ul>
<b>Implementation</b>	<ul style="list-style-type: none"> <li>- Resources necessary for successfully achieving objective:</li> <li>- Human, communications, financial</li> </ul>
<b>Monitoring &amp; reporting</b>	<ul style="list-style-type: none"> <li>- Who/what is responsible for monitoring implementation?</li> <li>- Mechanism for collecting and sharing data among stakeholders?</li> <li>- Mechanism for triggering regular updates to action plan</li> </ul>

Questions to consider when developing nitrogen Nation Action Plans:

- System change vs. gradual optimization?
- Value of aspirational targets?
- Low hanging fruit as a priority?
- What can be done with existing data? How can we get better data?
- Strategies for balancing benefits of trade with risks of leakage?
- How to go beyond the farm in agri-food policies?
- Coordination between policies/ministries?

## WORKSHOP PARTICIPANTS DETAILS

### SOUTH ASIA GOVERNMENT NATIONAL FOCUS POINTS (TOTAL 9)

Country	Representatives Name	Role	Organization
Sri Lanka	Dr.Anil Jasinghe	Secretary	Ministry of Environment
	Ms W.A Himali De Costa	Assistant Director, Land Resources	Ministry of Environment
India	Mr. N. Subrahmanyam	Scientist	Ministry of Environment, Forest and Climate Change
Bangladesh	Mr. Md. Lutfor Rahman	Deputy Secretary	Ministry of Environment, Forest and Climate Change
	Mr. Syed Ahmmad Kabir	Deputy Director	Ministry of Environment, Forest and Climate Change
Maldives	Ms.Fathima Nashwa	Chemicals Management Officer	Ministry of Environment Climate Change and Technology
	Ms.Mariyam Samha	Environment Analyst	Ministry of Environment Climate Change and Technology
Nepal	Mr. Raju Gurung	Assistant Soil Conservation Officer and UNCCD-Nepal team member	Ministry of Forest and Environment
	Nr. Prakash K.C.	Environmental Inspector	Department of Environment

### SOUTH ASIA CO-OPERATIVE ENVIRONMENT PROGRAMME (SACEP) (TOTAL 2)

- Director General of SACEP - Dr. Md. Masumur Rahman
- Programme officer- Priyankari Alexander

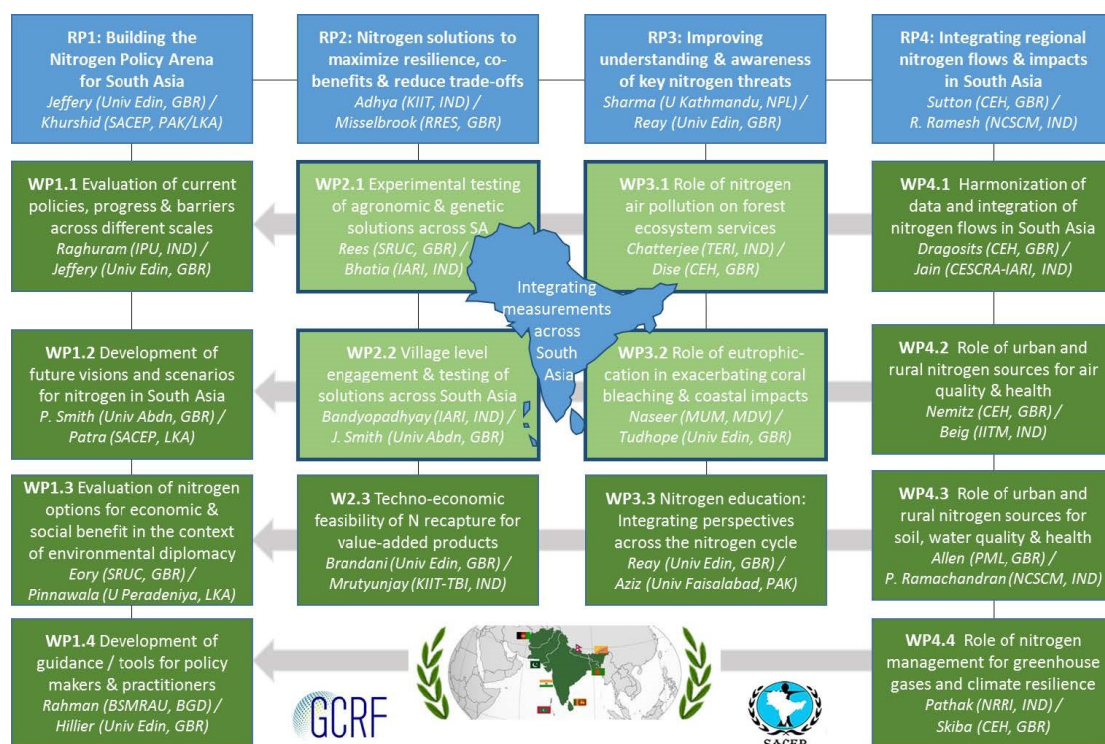
### SOUTH ASIA NITROGEN HUB SANH (TOTAL 34)

**TABLE 1. SANH MEMBER WORKSHOP PARTICIPANTS**

	Name	Project role	Institutional affiliation	Country
<b><i>SANH online workshop participants</i></b>				
1.	Prof Mark Sutton	SANH Project leader	Centre for Ecology and Hydrology (CEH)	UK
2.	Dr Azhar Abbas	Assistant Professor, WP1.1 country lead	University of Agriculture, Faisalabad, Pakistan	Pakistan
3.	Dr Dali Nayak Rani	Research Fellow, co-lead on WP1.2	University of Aberdeen	UK
4.	Prof Nandula Raghuram	WP1.1 co-lead, professor, NGO director	Sustainable India Trust	India
5.	Prof Zikrullah Safi	SANH Country lead WP.1.1	Kabul University	Afghanistan
6.	Pete Smith	SANH Wp1.1, Executive Director of Nourish Scotland	Nourish Scotland	UK
<b><i>SANH workshop participants (in person)</i></b>				
7.	Dr Anastasia Yang	Senior Research Fellow, co-coordinate WP1.1	University of Edinburgh,	UK
8.	Prof Roger Jeffery	RP1 co-lead, WP1.1 co-lead, professor	University of Edinburgh	UK
9.	Dr Veronika Eory	SANH WP1.3 co-lead	Scotland's Rural College	UK
10.	Professor Rabi Narayan Subudhi	SANH WP1.3	KIIT University	India
11.	Girish Jha Kumar	SANH WP1.3	ICAR-Indian Agricultural Research Institute	India
12.	Dr Sangeeta Bansal	Research Fellow WP.1.1-	Sustainable India Trust	India

13.	Prof Sarath Nissanka	Country WP1.1 lead	University of Perdynya	Sri Lanka
14.	Prof Rajendra Joshi	SANH Country lead WP.1.1	Kathmandu University,	Nepal
15.	Prof. Mallika Rani Pinnawala	SANH Country co-lead WP.1.2	University of Peradeniya,	Sri Lanka
16.	Prof. Tapan Kumar Adhya	SANH RP2 co-lead. WP1.1. co-country lead	KIIT university	India
17.	Dr Ananta Narayan Panda	Research Fellow WP.1.1	KIIT university	India
18.	Prof Damodar Jena		KIIT University	India
19.	Dr Zameela Ahmed	SANH Maldives project manager	Maldives National University (MNU)	Maldives
20.	Rifaath Hassan	SANH WP1.1 lead	MNU	Maldives
21.	Fathimath Shadiya	SANH Country lead WP.1.3	MNU	Maldives
22.	Fathimath Fairooza	Research assistant	MNU	Maldives
23.	Aishath Shehenaz Adam	Vice chancellor research and enterprise MNU	MNU	Maldives
24.	Raheema Abdul Raheem	Director of Research – MNU	MNU	Maldives
25.	Prof Md. Mizanur Rahman	SANH project manager Bangladesh, event co-organiser	Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU)	Bangladesh
26.	Dr Asif Reza Anik	WP1.1 country lead and Wp1.3 lead	BSMRAU	Bangladesh
27.	Sharmin Shifa	Research assistant	BSMRAU	Bangladesh
28.	Dr Smriti Das	WP1.1 lead on stakeholder analysis	Teri School Of Advanced Studies	India
29.	Prof. Saiful Alam	Researchers	BSMRAU	Bangladesh
30.	Majharul Islam	PhD student	BSMRAU	Bangladesh
31.	H.M. Al-Amin	PhD student	BSMRAU	Bangladesh
32.	Sazzad Hossain	PhD student	BSMRAU	Bangladesh
33.	Dr. Umme Aminun Naher	CoPI, SANH	BRRI	Bangladesh
34.	Dr. Jatish Chandra Biswas	Advisory Member, SANH	Krishi Gobeshona Foundation (KGF)	Bangladesh
<b>Notes:</b> RP (Research package) WP (work package)				

## SANH PROJECT STRUCTURE



## ACKNOWLEDGEMENTS

We gratefully acknowledge funding from UK Research and Innovation (UKRI) through its Global Challenges Research Fund, which supports the GCRF South Asian Nitrogen Hub (SANH) which made this work possible, together with underpinning support from the project 'Towards the Establishment of an International Nitrogen Management System (INMS)' supported by the Global Environment Facility through the UN Environment Programme. We also acknowledge the effective support from the SANH coordination team, especially Dr Bill Bealey and Ms. Madison Warwick and the coordination team of SACEP. Indeed, we must acknowledge the tireless organisation and efforts of SACEP the Director General Dr. Md. Masumur Rahman and Priyankari Alexander that made the workshop possible. This workshop contributes to the work of the International Nitrogen Initiative (INI) and the Global Partnership on Nutrient Management (GPNM). We also want to acknowledge the valuable contributions of our SANH colleagues Prof. Roger Jeffery, Prof. Mark Sutton, Prof. Dr. Md. Mizanur Rahman and Asif Reza Anik and who all made key contributions to this event. We further acknowledge the effective support of all the members of SANH Work Package 1.1 and 1.3. We would like to sincerely thank the students of the Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU) who provided a spectacular cultural performance that brought the workshop to a close. A special thanks go to David Kanter for providing content for the workshop on the National Action Template. Lastly we would like to thank all those who participated in our workshop, both in person and online, contributing to the rich workshop discussions that will lead the way for further science-policy interactions on nitrogen in South Asia.

With thanks to our Funders:



### Report lead author:

Dr Anastasia Yang, School of Social and Political Science, University of Edinburgh, UK

### Report contributing authors:

Prof Roger Jeffery, School of Social and Political Science, University of Edinburgh, UK

Priyankari Alexander, SACEP Programme officer, Sri Lanka

Dr Sangeeta Bansal, Sustainable India Trust, India

Zameela Ahmed, Maldives National University, Maldives

Prof Dr. Mizanur Rahman, Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Bangladesh

Prof Rajendra Joshi, Kathmandu University, Nepal