

Maldives Nitrogen Policy Report Summary: Scientific Evidence, Current Initiatives and Policy Landscape

This summary provides an overview of the full UKRI GCRF SANH policy report for Maldives (2022). This report is the first of its kind, providing a necessary step to understanding the current nitrogen policy landscape for Maldives within the broader South Asian context. It highlights the issues and challenges around nitrogen pollution and management, with recommendations for action.



INTRODUCTION

- **Nitrogen is essential for life, but nitrogen in its reactive form (N_r) in excess can cause severe harm to people and the environment.** Excess reactive nitrogen (N_r) is a significant issue globally and for South Asia.
- Multiple sectors including agriculture, transportation, industry, and energy sectors have increased their scale and share of nitrogen pollution and related greenhouse gas (GHG) emissions due to growing anthropogenic demands.
- **Five principal threats of nitrogen pollution** are to water quality, air quality, greenhouse-gas balance, soil quality, ecosystems and biodiversity.
- Addressing climate change by reducing greenhouse gas (GHG) emissions is a key priority in international politics. **Managing nitrogen is essential for international climate change mitigation. Nitrous oxide (N_2O) has 300 times more warming potential than CO_2 .**
- **South Asia is a global hotspot for N_r emissions** for the main nitrogen compounds: nitrogen oxides, nitrous oxide and ammonia, with emission levels above global averages.
- **Nitrogen pollution can be managed directly or indirectly** by legislation, financial or regulatory measures taken by governments.
- Government and non-government measures can support and encourage efficient nitrogen management, and hence, minimize its negative impacts.
- **The management of nitrogen is a major issue of international policy, yet information about nitrogen policies at national levels is scarce.** There is a limited understanding of the policies, the issues addressed, and the types of instruments used, and how existing policies might impact nitrogen pollution.

UKRI GCRF SOUTH ASIA NITROGEN HUB (SANH)

- **SANH aims to tackle the nitrogen challenge by bringing together experts from leading research organizations from across South Asia and the UK.** The hub focuses on four main areas: i) building the nitrogen policy arena for South Asia; ii) finding nitrogen solutions; iii) improving understanding and awareness of key nitrogen threats; iv) integrating information on regional nitrogen flows and impacts in south Asia.
- The South Asia Co-operative Environment Programme (SACEP) and SANH undertook an initial **South Asian regional assessment of nitrogen emissions and policy and created [a database of 966 nitrogen-relevant policies from South Asia](#).**
- Drawing on that database, this SANH national report outlines the implications of these findings for Maldives. The country report provides a national overview on the extent of nitrogen-related policies for Maldives.

NITROGEN-RELATED POLICY ANALYSIS FOR MALDIVES

- For Maldives, 40 directly and indirect nitrogen-related policies, were collected, contributing to 4% to the SANH South Asia policy database.
- **All nitrogen-related policies collected were classified** based on certain characteristics. Classifications include: environmental sink¹; sector; sub-sector; policy type; pollution source type; impact direction; relevance; and impact scope.
- **The policy type classification indicates the type of policy instruments that are incorporated within a particular policy.** A single policy may have multiple policy type characteristics, which indicate a more comprehensive approach. **For Maldives, there were 66 classifications from the 40 policies, 19 (48%) of which had more than one policy type identification.** The most common classification for policy type was for framework (36%).
- **Sector-wise the most common classification of policies was for multiple sectors at 35%.** This is an advantageous policy characteristic indicating an understanding that multiple sectors have roles to play in N_r management by linking across sectors.
- **For environmental sinks, the most common classification was for multiple sinks at 43%.** Multiple sink related policies are considered favourable as they consider multiple environmental areas and are better placed for N_r management.
- **Policies classified as having low relevance and/ or low impact scope were omitted (11 policies, 28%), leaving 29 policies for further assessment.** These were assumed to have a greater impact on how N_r enters the environment. Those policies identified to have a lower relevance and/ or impact scope should not be considered as irrelevant and via amendments could be better adapted to mitigate N_r waste.
- **More than half the policies (63%) were identified as having a potentially positive impact on N_r management,** as they were mostly environmentally orientated policies. Policies classified as mixed/ neutral (38%), indicate to varying degrees dual goals for economic development and the environment. **There were no policies identified with a negative impact direction, i.e., ones that risk increasing N_r waste.**
- **Policies that address multiple sinks and/or sectors (with integrated objectives), identify pollution sources, and contain multiple policy types are well placed to confront the multidimensional challenges of nitrogen management.**



DRIVERS OF REACTIVE NITROGEN EMISSIONS

- Emissions from all three nitrogen compounds, ammonia, (NH₃), nitrogen oxides (NO_x), and nitrous oxide (N₂O), have been increasing over time in south Asia and Maldives. These results highlight that current policy efforts so far have not been able to stabilise or reduce N_r emissions.
- N_r emission levels will continue to increase unless further policy action is taken at international, national, and local levels.
- Nitrous oxides (N₂O) have the steepest rise in Maldives since 2000 to 2015 with +171%.
- There was a +169% increase in nitrogen oxides (NO_x) between 2000 and 2015. **NO_x emissions are the highest (in total amount) compared to the other N_r compounds** and are a priority area for policy action.
- **For ammonia (NH₃) the emission levels in Maldives have been increasing steadily** with a +52% increase between 2000 and 2015.

¹ Sinks reflect the environmental aspect at risk (under threat) from N_r

- The emissions for NH_3 , NO_x , and N_2O in 2015 were 63,9974 and 157 tonnes/year.
- **The main sector sources of NO_x are the same factors for South Asia including road transport (47% in 2015) with aviation and marine transport sources as minor contributors in comparison.**
- **'Indirect N_2O emissions from atmospheric deposition of nitrogen in NO_x and NH_3 ' was the main source of nitrous oxide (N_2O) at 57% followed by 'waste water treatment and discharge' (16%), road transportation (11%), and other sectors (9%) as the biggest contributors.**
- **Energy contributes to 40% of NO_x emissions and 21% of ammonia (NH_3) emissions in 2015 in Maldives.** Electricity generation is one of the main sources of greenhouse gas (GHG) emissions for Maldives. Maldives achieved universal access to electricity in 2008 yet national energy needs are almost solely reliant on fossil fuels. The main source of energy is oil (99% in 2018) and only 1% is sourced from renewables
- **Ammonia (NH_3) emissions in Maldives were from a range of sources including buildings (30%), electricity and heat (21%), solid fuels (17%) road transport (11%), etc.**
- **Agriculture is not the main source of N_r emissions (NH_3 and N_2O) in contrast to the regional South Asia findings and compared to the other South Asia countries.**
- **Transport is one of the main contributing sources to nitrogen oxide (NO_x) and ammonia (NH_3) emissions in Maldives.** According to EDGAR data, road transport is the largest contributor to NO_x emissions with aviation and marine transport sources more minor contributors in comparison.

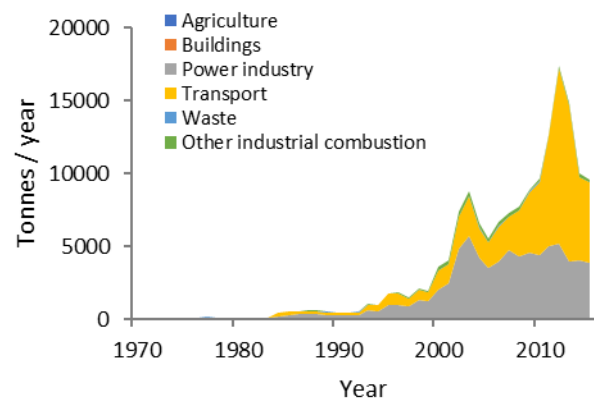


Figure 1: Trend in Nitrogen oxide (NO_x) emission by main sectors in Maldives Source: EDGAR v5.0 Global Air Pollutant Emissions data sourced from Crippa et al (2019a)

NEEDED ACTIONS

- ❖ In Maldives, 29 policies were highly related to nitrogen, but only a few of these specifically referenced nitrogen or its compounds. **As well as addressing nitrogen management systematically, such policies should also be accompanied by direct actions, such as 'core' policies, that contain regulatory and economic policy instruments.** Setting quantifiable and enforceable constraints on N_r production and consumption in nitrogen-related policy is recommended.
- ❖ **Existing policies can also be adapted to deal more directly/ effectively address nitrogen management by referring explicitly to nitrogen pollution and relevant N_r compounds.**
- ❖ Policies need to specifically indicate N_r specific pollution source types and the risk of nitrogen waste in order to address nitrogen management. Only a small number (5% from a total of 29) of directly relevant policies were identified that fit this category.
- ❖ **Sector-based policies need to be directly linked to other policies to mitigate negative N_r impacts referring to one or more environmental sink.** A large proportion of Maldives's nitrogen relevant sector-based policies were classified under multiple sinks (35%) followed by waste & waste water (30%).
- ❖ **To deal with N_r pollution better, it is necessary to have policies that address multiple sectors and sinks and policy instruments.** Currently, two policies meet this criterion to some degree. Although not all policies would need to be integrated in this manner, a policy gap is visible.

- ❖ Tourism is one of the main contributors to Maldives’s GDP and also a core contributor to national N_r emissions through sectors such as transport. Lack of an overarching transport policy is considered a major gap in mitigating N_r emission.
- ❖ **Tourism is also related to agriculture.** Currently Maldives imports 90% of the food consumed in the country. The Government has instigation strategic plans to develop the agriculture including, increasing production of identified crops for self-sufficiency and reduction of imports.
- ❖ **MoECCT has launched regional Air Quality Monitoring with the installation of 8 low-cost monitoring sensors across the country.**
- ❖ **The NDC implementation proposes 22 mitigation actions aimed at reducing GHG emissions by 24% (MEE, 2018).**
- ❖ **Action is needed in emerging sectors, considering relative changes in N_r emissions.** Policy instruments need to take into consideration and address N_r emissions from emerging sectors and identify mitigation measures.
- ❖ **The development of National Action Plans is advised in the United Nations Environment Assembly (UNEA-5) new resolution on sustainable nitrogen management.** Maldives has the ability to strengthen regional and international commitments such as support of UNEA-5.2 and preparing for UNEA-6 to manage nitrogen sustainably.
- ❖ **Further in-depth research on these N_r relevant policies is necessary, to assess, amongst other aspects, their impact.** SANH will continue to analyse N-relevant policy and engage with SACEP member states to broker a better understanding.
- ❖ **Science-based decision-making is crucial to move towards N_r sustainability and SANH is supporting this journey to create the scientific evidence of the sources and causes of emissions, and ways to mitigate their impact.** SANH will aim to improve the scientific and technical base and help strengthen Maldives contributions to address N_r both nationally, regionally and beyond.

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In partnership with:



The South Asian Nitrogen Hub (SANH) is a UKRI GCRF funded research partnership that brings together 32 leading research organisations and project engagement partners from South Asia and the UK. SANH is working towards enabling South Asia to ‘adopt and champion a strategic approach to nitrogen management as a key step towards the Sustainable Development Goals’. SANH aims to provide relevant scientific insights identify barriers to change and demonstrate the economic benefits of tackling nitrogen. <https://sanh.inms.international/>



Photo: Maldives National University