

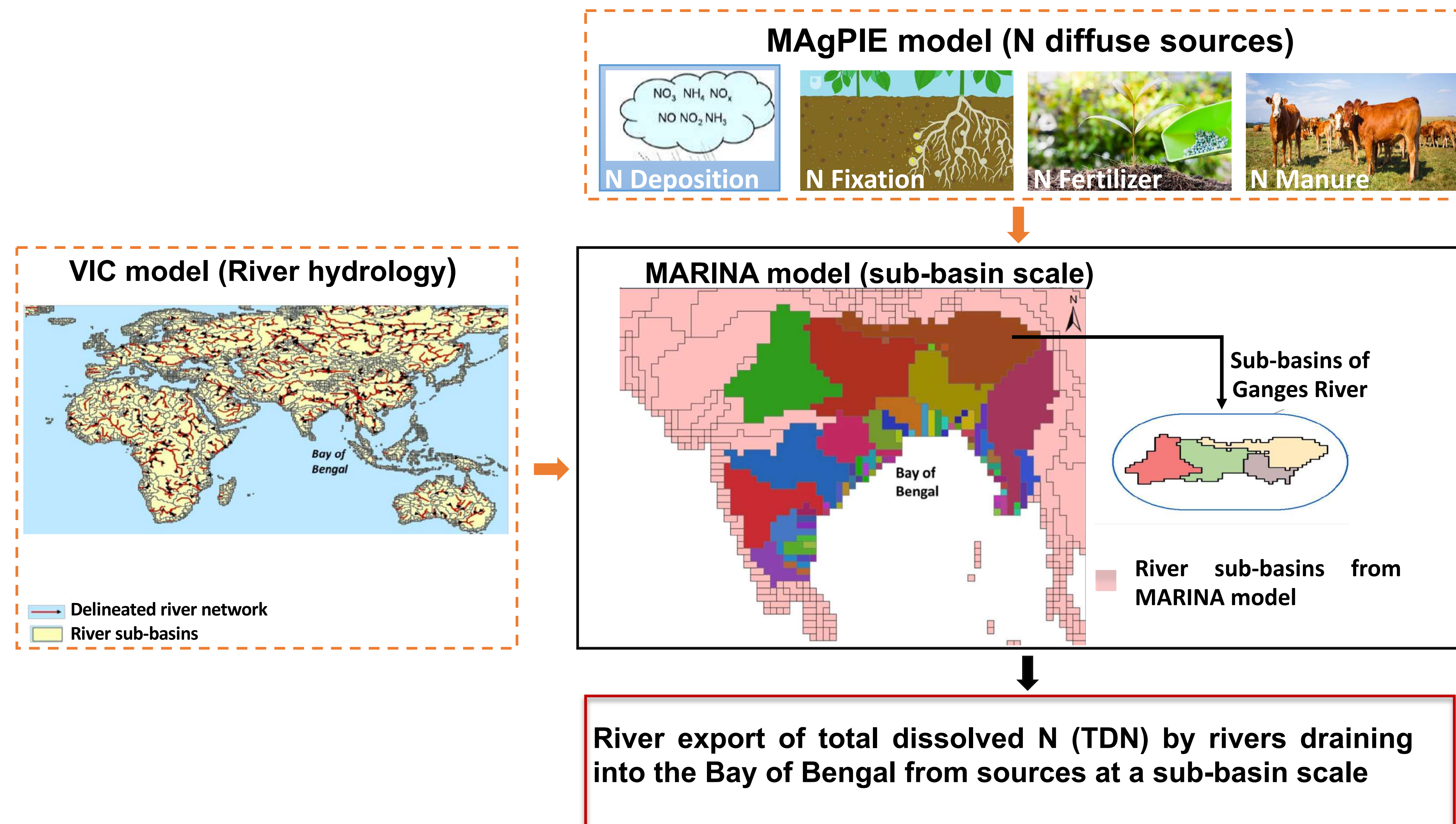
Reducing future nitrogen pollution in rivers of the Bay of Bengal

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MAgPIE: Model of Agricultural Production and its Impact on the Environment (Bodirsky et al., 2012, Dietrich et al 2019)

VIC: Variable Infiltration Capacity (Liang et al., 1996)

MARINA: Model to Assess River Inputs of Nutrients to seAs (Strokal et al., 2019)

Introduction

- Eutrophication is largely caused by increasing amounts of nitrogen (N) in rivers.
- Reducing total dissolved N (TDN) in rivers can contribute to achieve Sustainable Development Goal 6.

Methods

- We develop and apply the MARINA model. For diffuse sources and hydrology, we use outputs from the MAgPIE and VIC models, respectively.
- For future (2050), we propose three alternative scenarios based on the Baseline (BL) scenario according to Shared Socio-economic Pathway 2 (Table 1)
 - URB = Expand urbanization
 - OD = Stop open defecation
 - TT = Implement advance technologies

- Anthropogenic sources** are responsible for over half of river pollution in 2010
- The river export of nitrogen is expected to more than **double** between 2010 and scenarios without advanced technologies
- River export of nitrogen is expected to **decrease** in 2050 in the scenario with advanced technologies (TT) relative to the other scenarios
- The Ganges River** exports the dominant amount of nitrogen to the Bay of Bengal
- Improving treatment efficiencies** is needed to reduce river pollution.

Table 1: Scenario description for 2050

Main aspects	Alternative scenarios		
	URB	OD	TT
Population connected to sewage systems	High	High	High
Open defecation	Yes	No	No
Treatment efficiencies	No improvement	No improvement	Improved

Results and conclusions

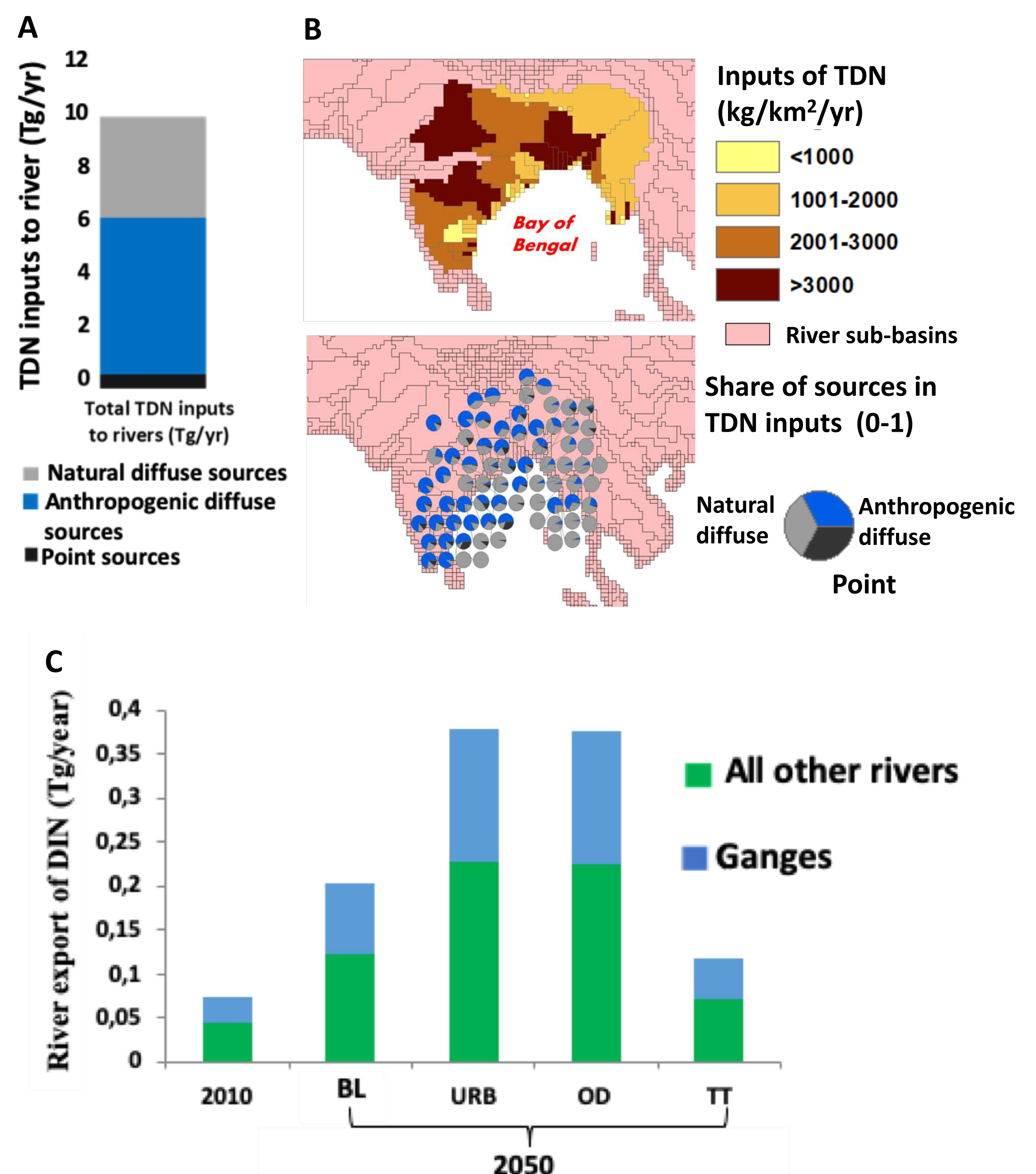


Figure 1. (A): Inputs of total dissolved nitrogen (TDN) to rivers draining into the Bay of Bengal from sources in 2010 (Tg/yr). (B): Inputs of TDN to rivers per km² of sub-basins areas (kg/km²/yr) and the share of sources in these inputs (0-1). (C): River export of dissolved inorganic nitrogen (DIN) in the past (2010) and future (2050) under the Baseline (BL), urbanization (URB), open defecation (OD), Tertiary treatment (TT) scenarios (Tg/yr)

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