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Recent trends of human wellbeing in the Bangladesh delta

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ABSTRACT

Although recent studies show that human wellbeing on global and national scales is improving, it is important to monitor the regional progress of human wellbeing and Millennium Development Goals (MDGs). Here we provide an assessment of human wellbeing in the south-west coastal part of Bangladesh by analysing Household Expenditure Survey (HIES) and Demographic Health Survey (DHS) data from 1995 to 2010. Indicators have been selected based on the five dimensions of human wellbeing, including health, material condition, personal security and freedom of choice and actions. This study shows that the south-west coastal region has made commendable progress in meeting the target MGDs goal for 'child and maternal health'. However, the areas of 'personal security' and 'freedom of choice and action' have not achieved the target MDGs despite showing substantial progress for 'poverty alleviation' (17%), 'sanitation coverage' (40%) and 'education' (23%). Incomes from fishery and 'non-ecosystem' based livelihood have increased 76% and 8% respectively, whereas income from shrimp and agriculture show declining trends. Production costs have increased substantially since 1995 in response to a rise in GDP. At a household level, proxy indicators of provisioning services, such as crop production, are positively correlated with poverty alleviation. Overall, greater attention on education and sustainable land use is required if Sustainable Development Goals (SDGs) are to be achieved by 2030.

1. Background

Human wellbeing is the subset of economic (e.g. GDP, income) and social wellbeing (e.g. education, health) factors (OECD, 2013) and has been classified into five dimensions: health (e.g. child mortality), material (e.g. income), security (e.g. sanitation), freedom and social relations (MA, 2005). Human wellbeing has been used to measure the progress of humanity such as the "health for all" goal set in 1990 and to design development strategies (McGillivray and Clarke, 2006). However, monitoring of the Millennium Development Goals (MDGs) is still very challenging mainly because of the spatial heterogeneity of human well-being with respect to social norms and access to ecosystem services (MA, 2005) and also data unavailability in low and middle income countries (UN, 2014). This difficulty in monitoring the MDGs is a major issue, as more than one billion people across the world are still living below the extreme poverty line set at $1.00 per day (McGillivray, 2006). Despite many studies that show increasing trends of environmental degradation (e.g. Zhang et al., 2015;

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Dearing et al., 2014), the global average of human wellbeing is improving (Raudsepp-Hearne et al., 2010). Although ecosystem services make significant contributions (both direct and indirect) to security, basic materials and health for human wellbeing (Santos-Martın et al., 2013; MA, 2005), the relationships between ecosystem services and human wellbeing are complex (Vidal-Abarca et al., 2014; Raudsepp-Hearne et al., 2010). In particular, while the more efficient use of provisioning services (e.g. crops, fish) has supported poverty alleviation and human development (Scherr, 2000; Irz et al., 2001; CRA, 2006; Santos-Martın et al., 2013), the effects of declining regulating and supporting services on wellbeing may be nonlinear and long term (Balmford and Bond, 2005; Raudsepp-Hearne et al., 2010). Besides the contribution of provisioning services to human wellbeing, government initiatives for education and health, technological progress, development and investments are some of the prime factors explaining the positive global trends of human wellbeing (Cervellati and Sunde, 2005).

Risks of negative impact on human wellbeing due to environmental change are increasing at both the global (Rockström et al., 2009) and regional scale (Dearing et al., 2014). These studies show that humankind has already transgressed the safe operating space (point beyond which is dangerous to humanity) for some of the planetary boundaries such as climate change, biodiversity and water quality. However, there are no systematic analyses that consider the impact on social systems (i.e. human wellbeing) in terms of the capacity and resilience of societies in the face of changing environments (Raworth, 2012). For this purpose, it is essential to develop an understanding of the dynamics of regional social and ecological systems, and their inter-relationship.

Bangladesh is one of the most densely populated countries of the world. It faces many challenges to meet the MGDs, specifically in alleviating poverty and providing education for all and access to health care. However, it has shown quite remarkable progress in achieving MGDs goals including a reduction of around 60% child and maternal mortality (Chowdhury et al., 2011) together with 2.5% poverty reduction per year (BBS, 2011; UNDP, 2014). Beside these development issues, Bangladesh possesses a highly complex and challenging environment, encountering yearly natural disasters including floods, droughts and cyclone surges. Urbanisation, increased salinity and risks associated with climate change are all likely to increase in future (ADB, 2005). Due to this, quantification of the impacts on human wellbeing is important for regional sustainability in Bangladesh. Previous studies in Bangladesh have focused on analysing trends of environmental degradation (e.g. Hossain et al., 2015) and national progress of human wellbeing (e.g. Chowdhury et al., 2011). Despite research showing that provisioning services are most influential for improving human wellbeing (Raudsepp-Hearne et al., 2010), no studies have investigated the regional progress of MGDs and the income of people engaged in different occupations that are directly dependent on provisioning services as their income sources (e.g. farmers, fisherman, and shrimp farmers).

In this new study, we extend our previous work (Hossain et al., 2015) on trends in ecosystem services in south-west Bangladesh by reconstructing decadal changes in human development based on 13 human wellbeing indicators in households engaged in agriculture, fishery, forest resource collection and shrimp farming. Moreover, we have analysed new datasets such as Household Income and Expenditure Survey (HIES) and Demographic Health Survey (DHS) for observing and understanding the causes of recent trends of human wellbeing and policy implications for SDGs 2030 at regional scale. By quantifying the parallel changes in ecosystem services and human development, the study can serve as the basis for monitoring the process of rising wellbeing. Such analyses are a prerequisite for drawing together sufficient information and understanding of the socio-ecological system dynamics to enable the definition of a safe operating space for the region in the progress towards meeting the Sustainable Development Goals (SDGs) by 2030.

2. Methods

2.1. Study area

We have selected the south-west coastal part of Bangladesh as our study area (Fig. 1). This area represents 16% of the total land (~25,000 km^2) of Bangladesh, with a population of 14 million (BBS, 2010). This south-west coastal ecosystem produces more than 1300 million USD of Gross Domestic Product (GDP) (BBS, 2010), contributing 277 USD GDP per person (Sarwar 2005). However, around 38% people of this region live below the poverty line (BBS, 2010). HIES data indicate that livelihoods in this region are heavily dependent on agriculture (~40%), fisheries (~20%) and forestry (~25%). The world's largest mangrove ecosystem 'Sundarban' located in this region supports the livelihoods of around 1.5 million people directly, and 10 million people indirectly. In addition, the mangrove forest also protects around 10 million coastal people from storm surges (Islam and Haque, 2004).

2.2. Selection of indicators

Human wellbeing is a subset of economic and social wellbeing factors (OECD, 2013) and has been classified into five dimensions: health, material, security, freedom and social relations (MA, 2005). The list of human wellbeing indicators (Table 1) are selected according to the MDG goals (2015) for Bangladesh based on data availability, measurability and length of time series. We have used Household Income and Expenditure Survey (HIES) datasets collected by the Bangladesh Bureau of Statistics (BBS) and World Bank in 1995/96, 2000, 2005 and 2010 to compile data for the indicators such as income, sanitation, electricity, safe drinking water, crop production and production cost at household level. We have used