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The Socio-Economic Metabolism of an Emerging Economy: Monitoring Progress of Decoupling of Economic Growth and Environmental Pressures in the Philippines



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ABSTRACT

In many Asian developing countries, policy makers face tension between the needs of economic growth, human development and environmental sustainability. In a similar vein, the new global agreement on Sustainable Development Goals (SDGs) calls for the harmonization of economic and environmental goals. To shed light on the relationship between the economy and natural resources, our research investigates the case of the Philippines, employing a material flow accounting approach based on national statistical sources. We analyze domestic extraction, trade of materials and economic development from 1980 to 2014. We also explore differences between territorial (production) and footprint (consumption) accounts. We find that the Philippine economy managed to grow while reducing material intensity because of an increasing share of services sector activities. From net resource trade dependence in the 1980s, the Philippines become a net resource provider in 2014 because of increased extraction and exports of metal ores. Overall, the material requirements grew over the past two decades at lower rate than GDP, signifying relative decoupling. The new data and indicators we present are aimed to inform the national policy agenda. They may help to formulate policies that integrate economic and environmental priorities and guide the Philippines towards achieving the SDGs.

1. Introduction

The new Sustainable Development Goals of the United Nations (Griggs et al., 2013), the Paris climate mitigation agreements (United Nations, 2015) and the resource efficiency initiative of the Group of 7 economies (UNEP, 2016) all show renewed interest from the global policy community in reducing environmental pressures and impacts of economic growth to enable human development based on sustainable natural resource use and a decarbonized energy system. Harmonizing human development goals with environmental objectives and natural resource conservation, however, is a particular challenge for Asian developing countries and emerging markets that have a large backlog of infrastructure and human development needs.

The uneven distribution and ultimately finite supply of natural resources have been identified as important limiting factors for human wellbeing and economic prosperity (Behrens et al., 2007; Giljum et al., 2010). The intensifying rate of extraction in many places to meet burgeoning demand, resulting in overexploitation of the natural resource base in many countries, has been identified as a major global

environmental problem (Kovanda and Hak, 2007). The urgency for all nations to take action is highlighted in the Sustainable Development Goals (SDGs) released by the United Nations (2015) in August 2015, where one of the goals is to ensure the sustainable production and consumption patterns of nations. Sustainable consumption and production (SCP) calls for the efficient use of natural resources and for minimizing waste flows (UNEP, 2015a). Decoupling economic growth, employment and social progress from pressures and impacts on the environment is the ultimate objective of SCP. While this concept is not a panacea for the current complex socio-economic and environmental issues, it is nevertheless a very important policy program and includes efforts to raise the eco-efficiency of industries, encourage green public procurement and responsible household consumption, and increase investment into green infrastructure. SCP suggests that economic growth can be achieved while reducing environmental pressures and impacts, through prioritizing cost-effective options for decoupling in housing, mobility, food and energy provision. In the long run, decoupling may well enable better social and economic outcomes compared to business as usual (UNEP, 2015b).

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At the same time, technological advances, demographic change and economic growth in recent decades have resulted in unprecedented growth in global material consumption (UNEP, 2016). Most growth in material use has occurred in the Asia-Pacific region, the most populous and economically dynamic world region, which surpassed the rest of the world in terms of material use in 2008 (Schandl and West, 2010) and has now become the largest user of biomass, fossil fuels, metal ores and non-metallic minerals (UNEP, 2013). The new policy objectives of decoupling and decarbonization require robust information to guide policy formulation and to monitor and evaluate policy effectiveness. Indicators of material use that are complementary to the System of National Accounts (SNA) have gained popularity in many Asian countries, such as China (UNEP, 2011a) and Japan (Moriguchi, 2006; Hotta, 2011), wishing to pursue a policy agenda which integrates economic and environmental objectives.

The fact that the Asia-Pacific region has become so crucially important in global material use is reflected in the increased volume of scholarly studies of socio-economic metabolism and material flows for the region (Schandl and West, 2010; Schaffartzik et al., 2014) and a growing number of policy reports (UNEP, 2011b, 2013, 2015a). The UN Environment Asia and the Pacific Office has created a material flow dataset for all Asian developing economies based on internationally available data. Unsurprisingly, however, much attention in the global climate policy discourse and scholarly debate has focused on the “Growing Giants”, i.e. the BRICS countries and especially China and India (Hubacek et al., 2007; Tian and Whalley, 2010; UNEP, 2011a) due to the sheer size and dynamic growth of their populations, economies, and environmental pressures as well as the global repercussions of the material requirements of their economies. This means that other emerging markets have received less consideration, even if data has become available. Many countries have only been examined as constituents of global regions, obscuring country-specific details which may be key to understanding patterns. This fallacy may prove to be considerable: while relatively smaller than India or China, other emerging market countries are still among the most highly populated in the world; they cover large geographical areas and are often hotspots of climate impacts and biological diversity. Their accumulated economic activity and environmental impacts rival other global regions and are dramatically rising (UN DESAPD, 2015; IMF, 2015; Mittermeier et al., 2011). In other words, while there is only one China and one India, there are many developing countries that share comparable socio-economic growth paths. Knowledge obtained about one could very well be of substantial relevance to understanding general patterns of the material needs of economic development.

This study aims to fill this gap by an in-depth examination of the domestic material extraction and trade of materials mobilized by economic development and policy in the Philippines, which can serve as a case study for the socio-metabolic transition of a medium-sized emerging economy in the Asia-Pacific region and perhaps beyond.

Aside from statistics in international databases, there are several foundational studies on material flows and resource productivity specifically for the Philippines (Rapera, 2005; Maung et al., 2014; Martinico-Perez et al., 2016) which have progressively extended the scope and detail of data analysis, the length of the reporting period, and the socio-economic and environmental analysis of results. Building upon the foundations of our previous research (Martinico-Perez et al., 2016), this study applies the most up-to-date accounting methods, adapts them to the characteristics of a developing economy in Asia, and is solely based on national statistical data and case studies for the Philippines. The new dataset we present allows for verification of international data for the Philippines and also adds vital information that is missing when MFA data is sourced from global data sets alone. Our study extends the material flow accounts and indicators for the Philippines and presents a time series covering 1980 to 2014.

While previous MFA and socio-economic metabolism studies for the Philippines and the Asia-Pacific region examined material consumption

from a generalized perspective and on macro scales, the analysis of our data is based on three fundamental questions about the relationship of socio-economic and environmental systems specific to the Philippines. First, we ask how interactions between nature and society have changed over time through the extraction and consumption of materials. Second, we investigate trends in material consumption and environmental pressures to ask whether decoupling between economic growth and material use is occurring in the Philippines. Lastly, we aim to understand this interrelationship in terms of the development policies of the Philippines and their effect on the ongoing socio-metabolic transition. We show how development plans and policies relate to trends in socio-economic metabolism. We examine these questions by analyzing data for material productivity, material consumption and material footprint, and data for economic growth in various sectors of the economy. This study provides policy implications for the trends and changes in the socio-economic metabolism of the Philippines. These are also likely to be relevant to the policy community in ASEAN countries and beyond who share a common suite of economic and environmental problems.

2. Methodology

2.1. Material Flow Accounts

In this research we compile material flow accounts (MFA) for the Philippines covering the period from 1980 to 2014 based on the standard accounting approach outlined by the European Statistical Office (Eurostat, 2013) which, for many years now, has been the global standard (Fischer-Kowalski et al., 2011). We established the MFA accounts using national data from the Philippines Statistical Authority modified to meet the requirements of the material flow accounts. We also improved the data compilation methods compared to previous studies (Martinico-Perez et al., 2016) by covering important domains of material use prevalent in an Asian developing country, such as the Philippines, not addressed by the Eurostat guide. These domains include, for example, the subsistence sector and informal trade. In such areas we have developed additional data generation strategies not covered by the Eurostat guide.

Statistical data is aggregated to ten material categories and four main material categories (see Table 1). Specific aspects of material flows not covered by national statistics were estimated based on detailed case studies conducted in the Philippines. All material use is reported in tonnes per year.

2.2. Extraction of Raw Materials

2.2.1. Biomass

Biomass extraction data is sourced from agriculture, forestry and fisheries statistics of the Philippines. Seaweed harvest was accounted for in this study as it is planted and grown along ropes in the sea (BFAR, 2009). Household and subsistence consumption of fuel wood was estimated based on data from the Household Energy Consumption Surveys conducted in 1995, 1998, 2004 and 2011 (NSO, 1995, 1998, 2004, 2011). The ruminant livestock system in the Philippines comprises 90% and 99% backyard farming for cattle and water buffalo, respectively (Moog, 2006). Thus, grazed biomass was based on case studies on fodder availability from cropland and grassland areas in the Philippines for water buffalo, cattle and goats (Moog, 1989).

2.2.2. Fossil Fuels

Data for fossil fuels including coal, crude oil and natural gas was sourced from the Philippine Statistical Yearbooks (PSY), 1983–2014.

2.2.3. Metal Ores

It is a well-known issue of MFA that national statistics report metal production as either gross ore, concentrate or metal content

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