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Inequality and ecosystem services: The value and social distribution of Niger Delta wetland services

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ABSTRACT

The Niger Delta wetlands are of international importance for their biodiversity, and support a large human population. The value and distribution of wetland ecosystem service benefits and costs across the three main stakeholder sectors (local community, government and corporate) were investigated. Results show that the net monetary value of the wetlands is $11,000 per delta household of which $9000 was generated as cash income supporting household activities such as education and healthcare. The total annual value of provisioning services to local people is approximately $25 billion, about three times the value of oil production in the region. However, local communities also bear about 75% of the environmental costs of oil extraction, equivalent to about 19% of the oil industry profit. Local people, who experience considerable economic hardship and lack alternative income sources, receive little compensation from the oil sector. These results highlight the importance of understanding not only the benefits provided by Niger Delta wetlands, but also the distribution of the environmental costs associated with their use. We conclude that ecosystem service valuation studies should give greater attention to the social distribution of identified values. Such distributional analyses, rarely available, provide insight into how sustainable natural resource management policy and practice could be better aligned to social justice concerns.

1. Introduction

Natural ecosystems such as wetlands, forests and coral reefs provide valuable goods and services to people, and there is now strong interest in understanding these ecosystem services as a step towards sustainable natural resource use (Braat and de Groot, 2012; McKenzie et al., 2014; Potschin and Haines-Young, 2013). The value of ecosystem services globally was first estimated by Costanza et al. (1997), at around $33 trillion per year, after which interest in ecosystem service valuation has grown strongly. Ecosystem service valuation is the process of expressing a value for a particular environmental good or service in terms of something that can be quantified. Ecosystem service values can be expressed using sociological or ecological metrics, but are most are often expressed in monetary terms (Millennium Ecosystem Assessment, 2003).

With new data, recent studies have greatly increased the estimated global value of ecosystem services, with values of $125 trillion per year or more (Costanza et al., 2014; de Groot et al., 2012). Recent studies have also proved useful for estimating the benefits and costs associated with resource use and land use change (Costanza et al., 2014), and valuation studies have extended beyond aggregate valuation of ecosystem services to consider questions of value distribution (Bullock et al., 2011; Muradian et al., 2010). That is, there is recognition that ecosystem service studies also need to consider the distribution of ecosystem service value, and gains and losses in that value, across stakeholders in order to adequately ascertain the real value of ecological services and natural capital to dependent groups. This is a mainstream issue of concern to ecosystem managers and policy makers alike, and recognises that, while the benefits derived from an ecosystem can be widely dispersed, costs associated with ecosystem use are often highly localized, and hence compensation may be needed.

How state and international capital have sought to exploit natural resources (Christmann, 2004), and the social and environmental impact of these activities upon local people (Ludwig et al., 1993) have long been issues within the literature. Such concerns find common ground in the environmental justice movement, which in Western nations, has seen concerns expressed around disproportionate exposure to toxic risk of poor and coloured communities compared to white middle class communities (Cutter, 1995) and, increasingly, with unequal access to the prerequisite environmental

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information and capacity to challenge environmental decisions (Fish, 2011; Reed and George, 2011). Such environmental justice concerns are in practice evident worldwide with many communities experiencing environmental degradation from natural resource exploitation that has a profound impact on the ability to sustain their livelihoods (Kitula, 2006; Scherr, 2000). Managing the costs and benefits from resource use can be seen, therefore, as a key concern of researchers and policy makers.

These issues are particularly acute in Sub-Saharan Africa due to the scale of resource exploitation which is already large, and set to grow following discoveries of major energy and mineral reserves in Ghana, Kenya, Uganda, Tanzania and Mozambique (Vasquez, 2013; McDonald, 2012). However, local people, often uneducated and poor, find themselves having to deal with complex environmental issues for which they lack the skills, information, and capital to challenge the power interests developing the resources in their communities. The resulting unequal distributions of environmental 'goods' and 'bads' of resource exploitation often generate conflicts which threaten local, national and global security; such is the situation in the oil rich Niger Delta region of Nigeria (Ibeanu, 2000; Omeje, 2006; Agbola and Alabi, 2003).

Interest is growing in ecosystem service valuation within African environments (Schuyt, 2005), and indeed, in understanding their benefits distribution (Van Wilgen et al., 1998). However, a general lack of information on African ecosystem services means that land use change and resource development, with associated loss of ecosystem services, usually remains the more attractive option (Mmopelwa, 2006). Provision of adequate context specific information is needed to address this problem. To this end, economic valuation provides an important supporting framework that can generate insight into links between ecosystem services and human welfare, evaluate development alternatives by quantifying the costs and benefits associated with resource use options, and inform adjustments to national income accounts to recognise ecosystem service value (Turner et al., 2003; Turpie et al., 1999).

There is a rich literature on the value of wetland ecosystem services; (see for example Odum, 1978; Costanza et al., 1989; Mitsch and Gosselink, 2000). Much of the early work on ecosystem services valuation focused on wetlands primarily to demonstrate their high value to a wider audience (Turpie et al., 2010), especially those in parts of the world where wetlands were viewed as wasteland with no economic value (Mmopelwa, 2006). Schuyt (2005) argued specifically for economic valuation of African wetlands, not simply to demonstrate their value, but with a view to ensuring that they received greater protection, and so were better able to sustain the livelihoods of poor households dependent upon them. However, given the scale of dependent populations, surprisingly little is known of the monetary value of African wetlands. Analyses have been conducted across Africa (see Emerton et al., 1999; Turpie et al., 2006, 1999; Turpie, 2000; Adekola et al., 2012; Nabahungu and Visser, 2011) but West Africa is not represented. The Niger Delta is the principal wetland in the region, and home to many millions of people, yet little is known of its ecosystem value (global studies of Costanza et al., 1997, 2014; de Groot et al., 2012 did not value the Niger Delta wetlands as the required information was not available) and nothing of how this value is distributed among its various stakeholders.

Therefore, this paper aims to: (i) assess the monetary value of the Niger Delta wetlands provisioning services, and their importance to the livelihoods of local communities; and (ii) assess the distribution of cost and benefits across key stakeholder groups, which we define as local communities, government and the corporate sector. Section 2 of the paper introduces the region and the development issues it faces; Section 3 describes the methods used to determine aggregate wetland values in the region, and its distribution amongst the local community sector, government and corporations; Section 4 presents the results, and Section 5 further discussions.

2. The Niger Delta wetlands

2.1. Geography and people

The Niger Delta is located in southern Nigeria (4°2′–6°2′ north, 5°2′ east) in the lower reaches of the Niger/Benue River (Davies et al., 2009). When defined hydrologically, the Delta Region consists of Bayelsa, Delta and Rivers States (Fig. 1) an area of about 20,000 km^2 (Uyigue and Agbo, 2007; World Bank, 1995). Defined administratively, politically, or in terms of development objectives, the Delta Region includes all the oil producing States and this nine states region covers 110,000 km^2 (Ighodaro, 2005), and is home to 37 million people, 22% of Nigeria's population (National Population Commission, 2006). The region is ethnically varied, typifying the diversity and plurality that gives Nigeria its socio-political strength. The Niger Delta is generally rural, but includes important towns such as Port Harcourt, Warri and Asaba. The population is predominantly animist, attaching cultural values to local fauna and flora (Anwana et al., 2010; Adekola, 2014).

2.2. The Niger Delta environment

Geologically, the Niger Delta is regarded as a modern delta (under 100 million years old in the Mesozoic era, Cretaceous period) (Galloway, 1975; Okonny, 2002). According to Short and Staeuble (1967) there are three depositional cycles in the Niger Delta. The first began with a marine incursion in the middle Cretaceous and was terminated by a mild folding phase in Santonian time. The second included the growth of a proto-Niger Delta during the late Cretaceous and ended in a major Paleocene marine transgression. The third cycle, from Eocene to Recent, marked the continuous growth of the main Niger Delta. The main geologic formations extending across the whole of the Niger Delta are the sandy Benin formation (including the Afam clay), an intervening unit of alternating sandstone and shale named the Agbada formation, and a lower shaly Akata formation (Short and Staeuble, 1967). The accumulation of sedimentary deposits transported by the rivers Niger and Benue (World Bank, 1995), which discharge water, sediment and other loads across southern Nigeria and beyond into the Gulf of Guinea, resulted in the formation of this complex and fragile delta with a rich biodiversity (Abam, 2001). The Niger Delta is regarded as the third largest wetland in the world (Uluocha and Okeke, 2004; Umoh, 2008), and the largest river delta and mangrove ecosystem with the greatest extension of freshwater swamps in Africa (Ajonina et al., 2008; Dupont et al., 2000; Ogon, 2006).

The Niger Delta forms an integrated mosaic of aquatic, semi-terrestrial (mangrove and freshwater swamps) and terrestrial habitats (Bisina, 2006), which is highly diverse and supportive of numerous species of terrestrial and aquatic flora and fauna (Uyigue and Agbo, 2007). The three major vegetation formations in the Niger Delta are brackish water swamps (comprising mangrove forest and coastal vegetation), fresh water swamp forests, and riparian forests (Nyananyo, 1999, 2002). The brackish water swamps are dominated by white and red mangroves. Further inland from the coast into the fresh water swamp forests floating plants such as *vossia cuspidata* (hippo grass), *nymphaea lotus*, grasses and sedges begin to dominate. In the riparian forests no species can be said to be dominant, but, the region is home to some rare and endangered animal and plant species. Nyananyo (2006) identified 225 plant species in the Niger Delta, many of which are important as cultural, food, timber, medicine and industrial materials. The Delta has a rich flora and fauna, the richest biodiversity in Nigeria