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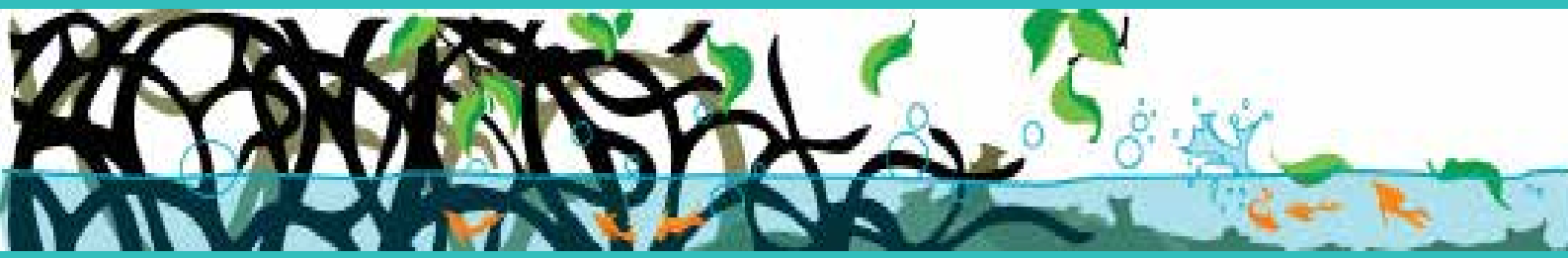
VALUING COASTAL ECOSYSTEMS AS ECONOMIC ASSETS

The importance of mangroves for food security and livelihoods among communities in Kilifi Country and the Tana Delta, Kenya

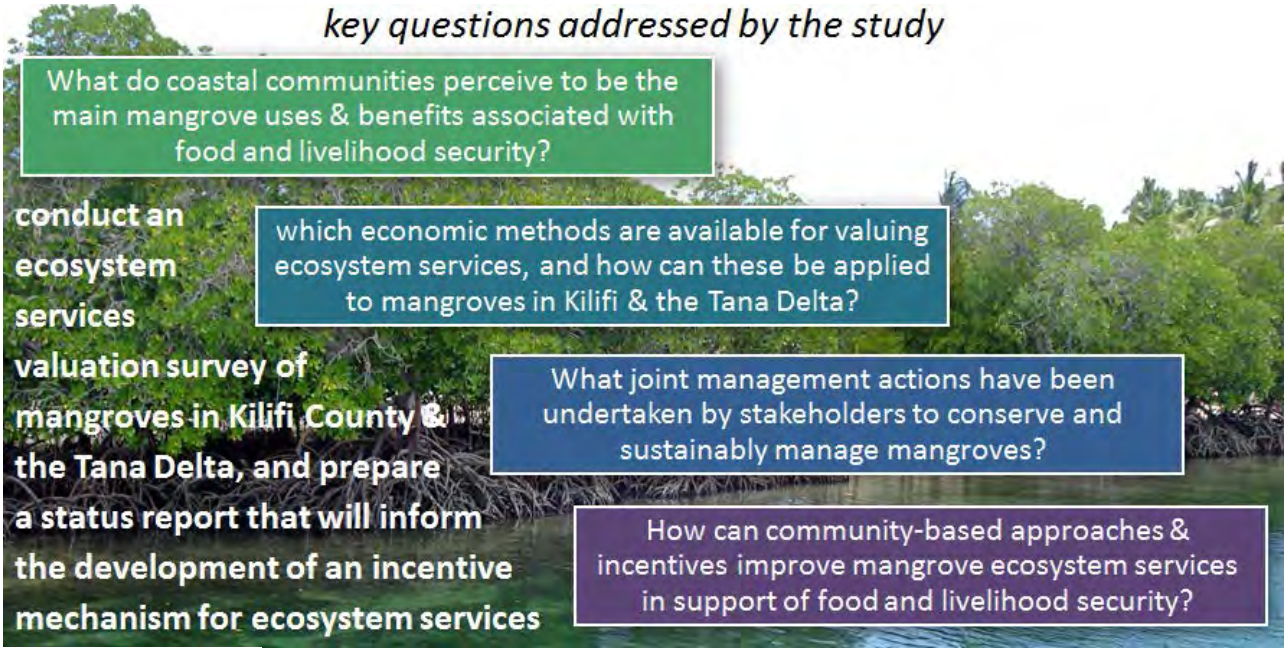


VALUING COASTAL ECOSYSTEMS AS ECONOMIC ASSETS:

The importance of mangroves for food security and livelihoods among communities in Kilifi County and the Tana Delta, Kenya

About the study

Led by the Food and Agriculture Organisation of the United Nations (FAO), the Blue Growth Initiative (BGI) has the goal of building the resilience of coastal communities and restoring the productive potential of fisheries and aquaculture. It is working in ten countries in Africa and Asia (including Kenya) to support activities that will bring about transformational change in the management and utilisation of marine and coastal resources and habitats, and help to reconcile economic growth and needs for food security with ecosystem conservation and sustainable use.



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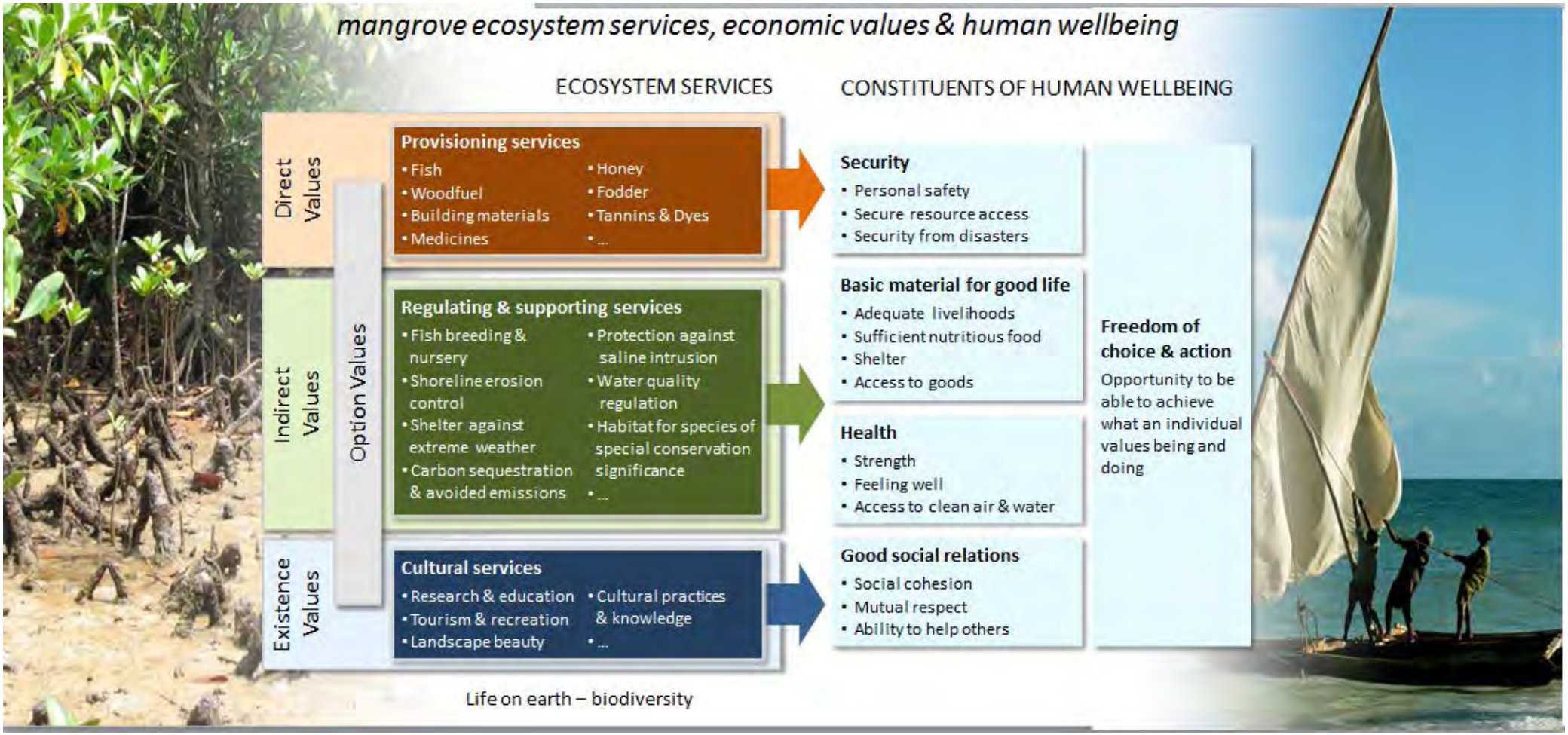
Between November 2015 and February 2016, the University of Nairobi and United Nations Environment Programme (UNEP) sponsored by FAO through the project "Ecosystem Services and Biodiversity for Food and Nutrition Security" (FMM/GLO/112/MUL BABY04) carried out a study to assess the value of mangroves for food security and improved livelihoods among coastal communities in Kilifi County and the Tana Delta. This aimed to generate information to guide FAO and other BGI partners in the development of an incentive mechanism for ecosystem services. The study was designed to investigate four key topics: local-level knowledge of mangrove uses and benefits, ecosystem service values, joint natural resource management experiences, and the need for community-based incentives.

The study follows the Millennium Ecosystem Assessment in characterising the benefits that people obtain from ecosystems as provisioning, regulating, supporting and cultural services. This reflects recognition that mangroves do not just generate physical products, but also provide the primary productivity and life support services that underpin human wellbeing and livelihoods in Kenya's coastal zone. This is overlaid with the Total Economic Value (TEV) framework, which groups environmental benefits into direct, indirect, option and existence values. TEV thus extends beyond the marketed and priced commodities to which economists have conventionally limited their analysis, and seeks to value the full gamut of goods and services associated with biodiversity and ecosystems.



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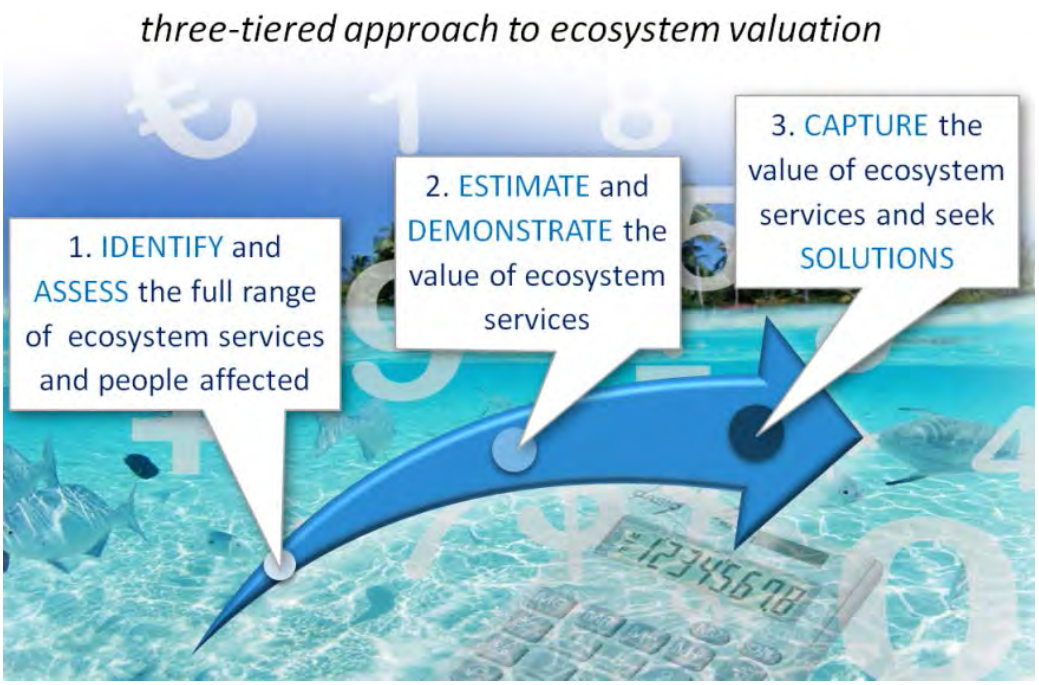
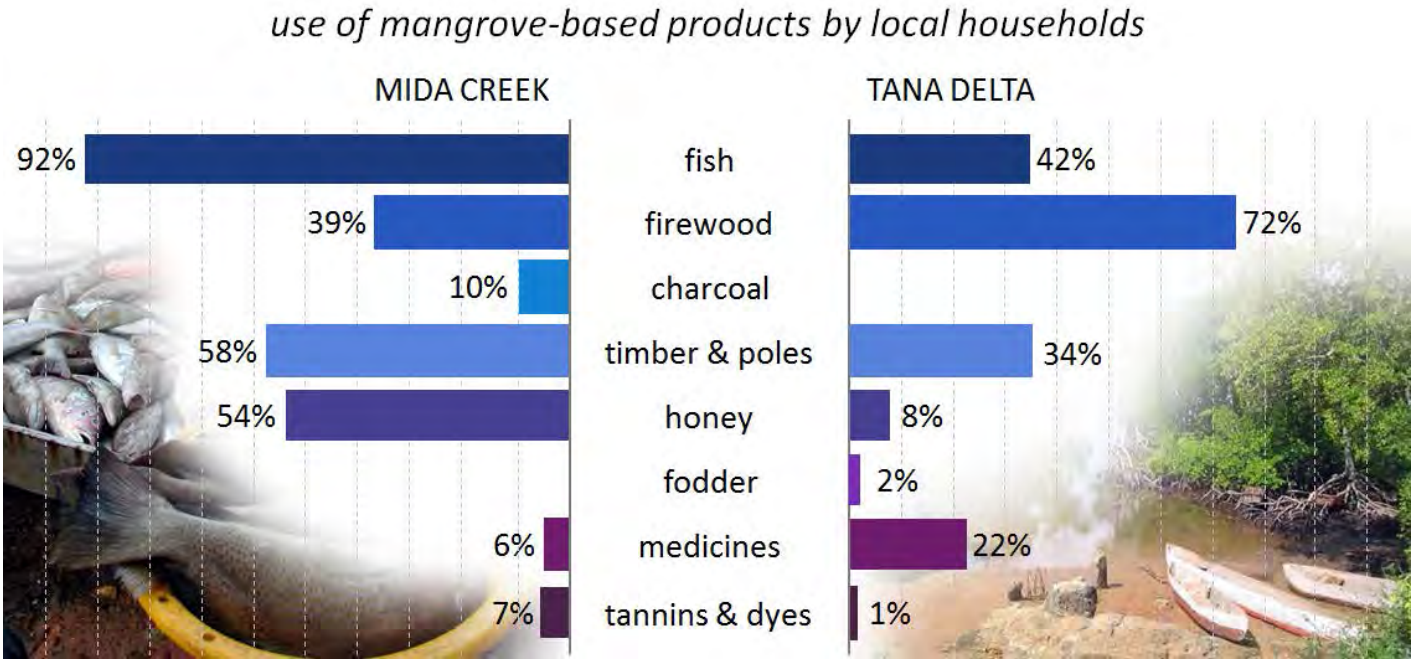


A three-tiered approach to ecosystem valuation is adopted, based on that proposed by the global initiative "The Economics of Ecosystems and Bio-diversity" (TEEB). TEEB offers a simple structure for linking economic valuation to the identification of policy instruments to strengthen the conservation and sustainable use of natural resources. It entails identifying and assessing ecosystem services and stakeholders, estimating and demonstrating economic values, and seeking solutions by identifying instruments for more effectively, equitably and sustainably capturing the value of ecosystem services.

How coastal communities perceive and use mangrove benefits

Mangrove cover in Kenya is currently estimated at somewhere between 55 000 and 60 000 hectares. More than two thirds of mangroves are located on the northern part of the coast, around Lamu-Kiungu and the Tana Delta, with the remainder spread across Kilifi, Mombasa and Kwale Counties. The study focused on two field sites: Mida Creek (1 660 hectares) in Kilifi County and the Tana Delta (2 350 hectares) in Tana River County. Its primary emphasis was on the 5 800 households or 36 000 people in the sub-locations that border mangrove forests in Mida Creek and the 4 400 households or 23 000 people in the Tana Delta. This equates to around 8 percent and 50 percent respectively of the total population of coastal wards in each County



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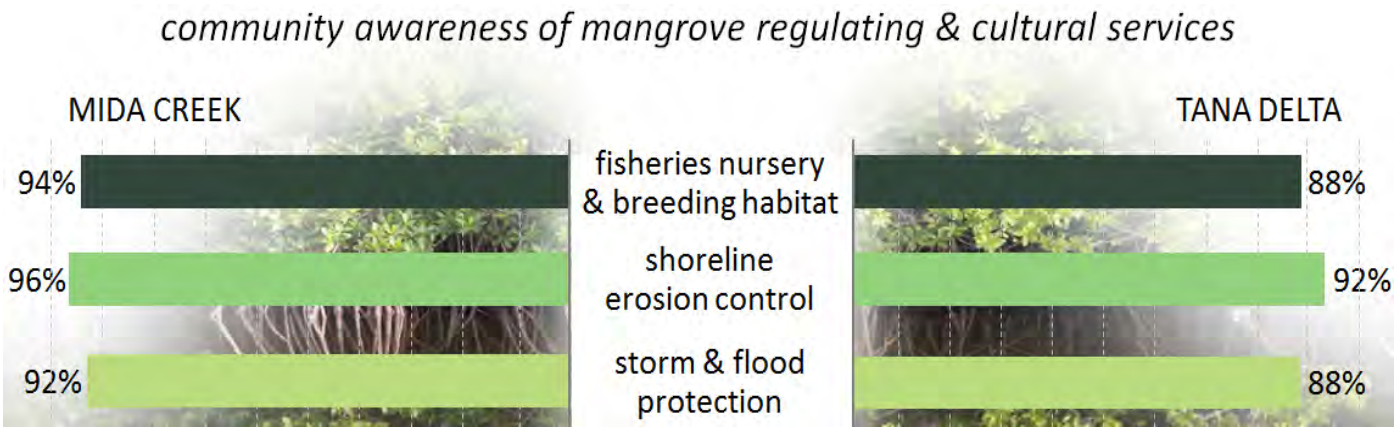
The study found that the vast majority of coastal households in the study sites are well aware of the benefits that can be obtained from mangroves. This high awareness is hardly surprising, given that most people depend on them in some way for income and subsistence. Eight kinds of mangrove products were prioritised as playing a particularly important role in food security and livelihoods: fish, firewood, charcoal, timber/poles, honey, fodder, medicines, and tannins/dyes.

These provisioning services or mangrove products support food security and livelihoods in a number of ways. They may be consumed directly (for example fish, honey and plant-based medicines), used as an input into other production processes (such as boats and traps for fishing, fodder for livestock production, or woodfuel for cooking), or sold to generate cash that can then be used to purchase food supplies and other items. Mangrove-based tourism also serves as an important source of income and employment for coastal communities, and was identified as a key service by 95 percent of survey respondents at the Mida Creek study site and 93 percent in the Tana Delta.



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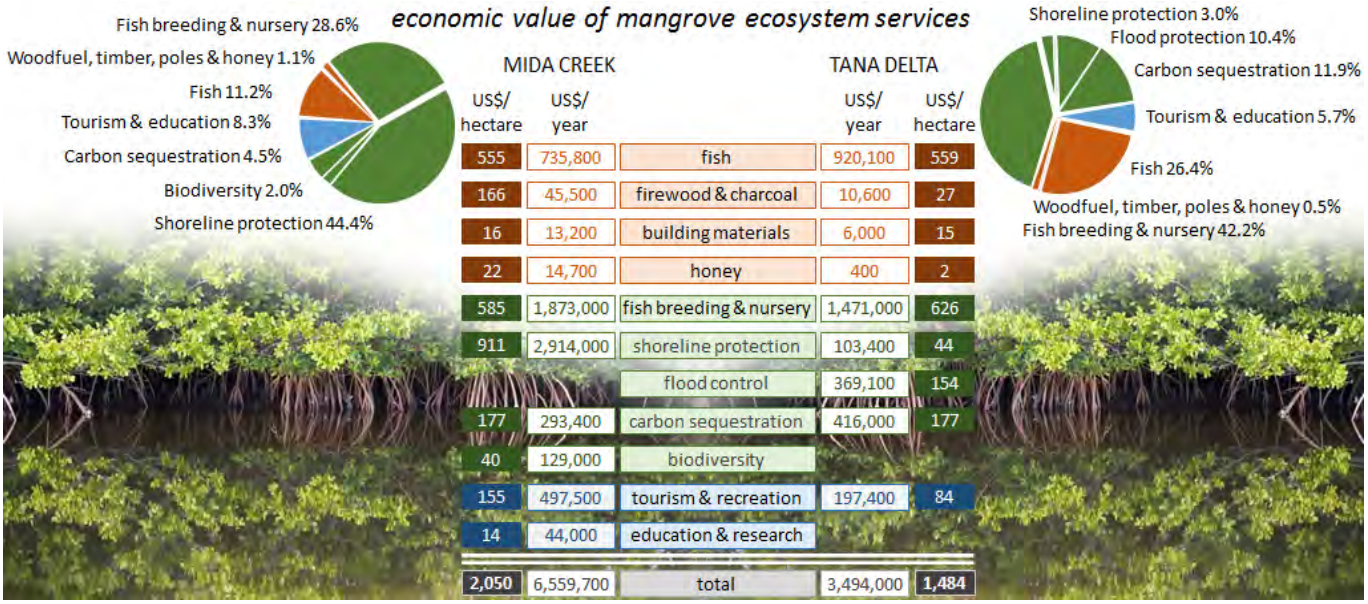
The study also showed that, in many cases, mangroves offer a source of subsistence and income that is readily accessible and affordable to coastal households. For example, fish usually contributes the only regular source of animal protein in the family diet, woodfuel often comprises the sole source of domestic energy, and plant-based medicines are commonly used as a core component of healthcare. Mangrove products tend to be especially important for poorer and more vulnerable sectors of the coastal population, and typically serve as fall-back or safety nets in times of emergency or stress, when other sources of income and subsistence fail. This is important to emphasise, given that the incidence of poverty in the study sites is markedly higher than in other parts of Kenya. The adult-equivalent poverty headcount is 71 percent in Kilifi County and 77 percent in Tana River County (as compared to a national figure of 46 percent), which are ranked 39 and 43 respectively (out of a total of 47 counties).

In addition to mangrove provisioning and cultural services, almost all of the households in the study sites were able to list a variety of regulating and supporting services that are considered play a key role in local livelihoods. The breeding, nursery, feeding and living habitat that mangroves provide for different life cycle stages of finfish, crustaceans, cephalopods and other molluscs has an obvious impact on local nutrition and livelihoods. Not only does it support and enable the mangrove fishery itself, but it also makes an appreciable contribution to catch and productivity in nearshore and offshore fisheries elsewhere. A recent study found, for example, that an average of 39 percent of the value of fish caught offshore on Kenya's coast came from mangrove-dependent species.

Survey respondents also highlighted the physical protection that mangroves offer against the effects of storms, tidal surges, coastal erosion and other natural hazards. These regulating services are particularly important, given that the low-lying coastal strip is particularly vulnerable to such risks, and contains a striking concentration of settlements, industries and infrastructure. The Tana Delta, for example, has been categorised as a as a high hazard probability area in relation to both natural disasters and human-induced risks. It is also worth noting that the severity of natural disaster and extreme weather events in Kenya's coastal zone is thought to be increasing as a result of climate change. Over recent years, coastal planning and policy has begun to shift progressively towards climate-compatible development approaches, with an increasing emphasis on facilitating adaptation, enhancing resilience and strengthening disaster risk reduction.

The study drew on the toolbox of methods that is currently available, and commonly used, to value biodiversity and ecosystem services. Market price techniques were applied to mangrove provisioning services such as fish, firewood, charcoal, timber, poles and honey (using local prices), as well as to carbon sequestration (based on the global voluntary forest carbon market). A choice experiments approach was used to assess community perceptions of the value of key regulating and supporting services, including fisheries nursery and breeding, shoreline protection, flood control and biodiversity services. The travel cost method was employed to estimate recreational values, looking at visitors' personal characteristics as well as their expenditures on transport, accommodation, food, entertainment and other items. Data were collected via questionnaire surveys administered to 831 local households and 298 international and local tourists, community focus group discussions, stakeholder consultations, expert interviews and a desk-based literature review.



MIDA CREEK US$/ hectare	MIDA CREEK US$/ year		TANA DELTA US$/ year	TANA DELTA US$/ hectare
555	735,800	fish	920,100	559
166	45,500	firewood & charcoal	10,600	27
16	13,200	building materials	6,000	15
22	14,700	honey	400	2
585	1,873,000	fish breeding & nursery	1,471,000	626
911	2,914,000	shoreline protection	103,400	44
		flood control	369,100	154
177	293,400	carbon sequestration	416,000	177
40	129,000	biodiversity		
155	497,500	tourism & recreation	197,400	84
14	44,000	education & research		
2,050	6,559,700	total	3,494,000	1,484

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The valuation exercise focused on those services that community members had identified as being of the greatest importance to local food security and livelihoods. In addition, carbon sequestration values were computed, because of their global economic significance. The economic value of these selected ecosystem services was found to be substantial: more than US$6.5 million a year in Mida Creek and just under US$3.5 million a year in the Tana Delta.

In both Mida Creek and the Tana Delta, regulating and supporting services were found to dominate, accounting for just under 80 percent and 70 percent of the total respectively (6.5 and 2.5 times as much as the value of provisioning services). There is, however, a substantial degree of variation in mangrove values between the study sites. Shoreline protection services contribute almost half of the total in Mida Creek, but less than 3 percent in the Tana Delta. Meanwhile, fisheries-related services stand out in the Tana Delta (almost 70 percent of the whole, as compared to 40 percent in Mida Creek). Although unit values for fisheries, building poles, breeding/nursery habitat and carbon are similar at both sites, those for woodfuel, tourism and (especially) honey and shoreline protection are many times higher in Mida Creek, suggesting a greater intensity of use. Overall, at just over US$2 000 a year, mangroves in Mida Creek are worth around a third more on a per hectare basis than those in the Tana Delta (US$1 500).

It is instructive to contextualise these figures by considering how they measure up to other economic indicators in the study sites – and to note that the value of mangrove ecosystem services is extremely significant when viewed in these terms. Expressed on a per household basis, at an average of US$800 per year in the Tana Delta and US$1 130 in Mida Creek, mangrove ecosystem services are worth around a fifth of County GDP and between twice and four times as much, respectively, as annual County development spending. At the aggregate level, mangrove values in Mida Creek exceed the local revenues raised by Kilifi County by almost 25 percent and are more than twice as high as annual expenditures on the entire environment and natural resources sector. In the Tana Delta, they are worth ten times as much as County revenues, and are almost 15 times higher than environmental spending.

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While the study focused primarily on local communities, it is apparent that many different groups are impacted by or have an interest in mangrove ecosystem services. These stakeholders range from the adjacent households that depend on mangrove products for their food and livelihood security, through the government agencies that are mandated to manage coastal resources and habitats, the community associations and civil society organisations that have been formed to support different aspects of mangrove use and conservation, to the other groups and sectors on the coast, in Kenya or even at the global level that benefit in some way from mangrove ecosystem services.

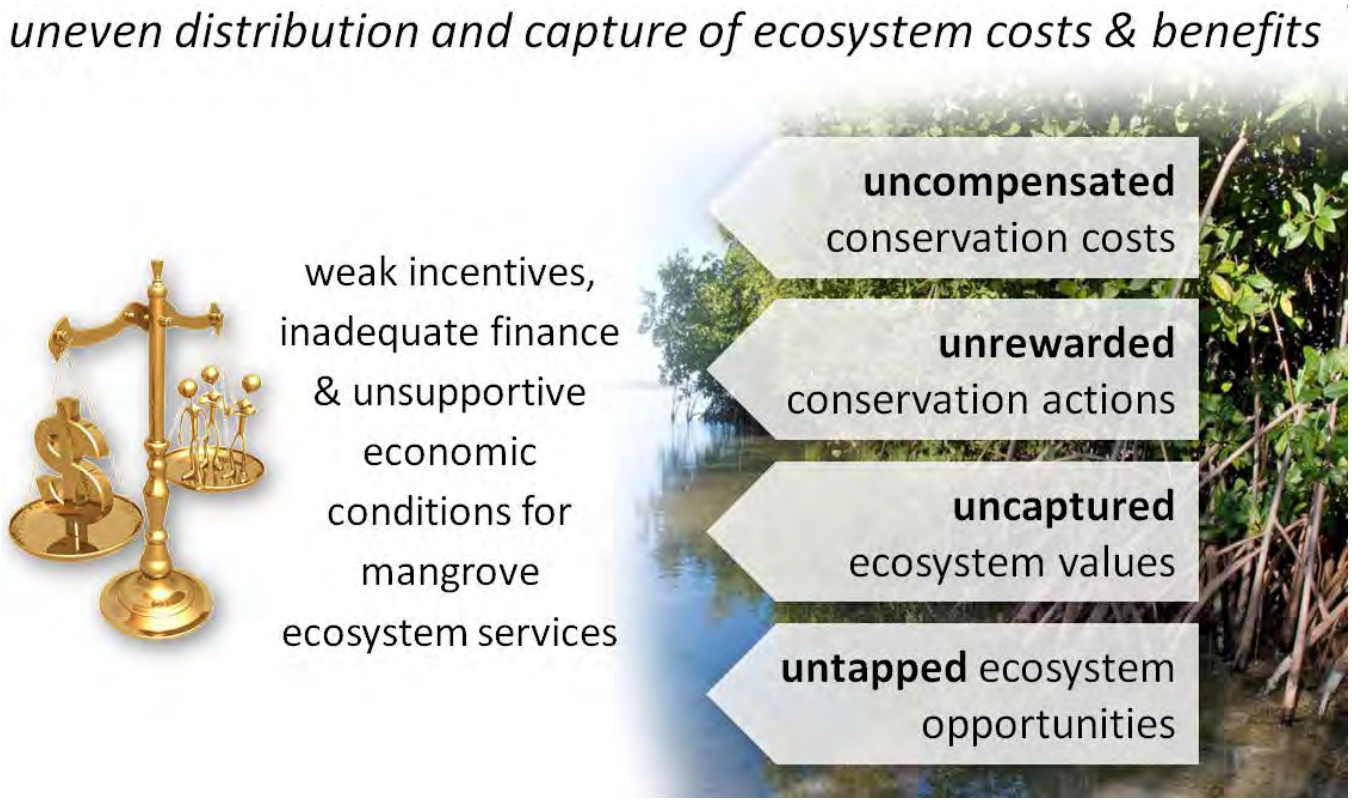
Yet, despite their high and wide-ranging social, economic and even cultural importance, mangroves are severely threatened. The area under mangrove forest in Kenya is thought to have declined by almost a fifth since 1985, with Kilifi and the Tana Delta showing some of the highest rates of loss: 76 percent and 38 percent respectively. Not only is mangrove degradation a biological and ecological issue, but it also poses a grave risk to the status, security and resilience of local livelihoods, and to coastal development processes more generally. These concerns are well-understood in both study sites: between 35-40 percent of households consulted stated that they considered mangroves to be somewhat or very degraded.

In response, local stakeholders have instigated a variety of mangrove conservation initiatives, working both individually and collectively, formally and informally. For example, the Mida Creek Conservation Group brings together community-based conservation organisations and local ecotourism operators to work hand in hand with the Kenya Forest Service (KFS) and Kenya Wildlife Service (KWS) on mangrove restoration, information and awareness, and the development of sustainable livelihood activities. In the Tana Delta, fishermen have organised themselves into Beach Management Units, which are involved in regulating mangrove harvesting and replanting. Community-based natural resource management activities also form a core component of KFS, KWS and County Government work plans in the two study sites, and several private sector and non-governmental organisations are involved in funding and/or implementing mangrove conservation and sustainable livelihood projects taking for example FMM/GLO/112/MUL BABY04: Ecosystem Services and Biodiversity for Food and Nutrition Security.

These joint actions to conserve and sustainably manage mangroves, although largely effective at the individual level, do however face a number of challenges – as articulated during the course of the fieldwork, and via a multi-stakeholder

consultative workshop held in February 2016 to present, discuss and validate the study findings. One key constraint is a lack of funding. Another barrier to mangrove conservation is the continuing lack of alternative income and business opportunities which would encourage and enable local households to shift away from unsustainable land and resource uses in mangrove areas. In addition, stakeholders reiterated how difficult it is for them to address external threats to mangroves. Land reclamation for agriculture, salt ponds, aquaculture and coastal infrastructure, as well as land and sea-based sources of pollution, were cited as some of the most pervasive – and yet intractable – causes of mangrove degradation and loss in and around Mida Creek and the Tana Delta.

Towards an incentive mechanism for mangrove ecosystem services



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The study yields a number of findings and recommendations for taking the BGI forward on the Kenyan coast. The data generated on values provide a powerful – and much needed – economic case for the substantial contribution that mangrove ecosystem services make to local livelihoods and food security in and around Mida Creek and the Tana Delta, as well as to development processes on other parts of the Kenyan coast and beyond. The review of stakeholder actions, conservation threats and challenges however also makes it clear that the uneven distribution and capture of these costs and benefits continues to undermine efforts to sustain and improve the flow of mangrove ecosystem services.

Four specific areas are identified which, if addressed and incorporated into the design of an incentive mechanism, might serve to foster more enabling economic and financial conditions for mangrove ecosystem services in Mida Creek and the Tana Delta.

Many of the **costs of conserving mangroves** (to secure valuable ecosystem services) **still remain uncompensated** (1), while the corresponding **conservation actions** also continue to **go unrewarded** (2). KFS, KWS and County Governments all face chronic budget shortages, and conservation NGOs and CBOs also find it difficult to access funding for mangrove conservation. At the same time, there are few mechanisms in place to balance the local opportunity costs of conservation. It is extremely difficult for the communities that live in and around mangroves to realise a net gain in material terms from conservation – especially

when compared with the high and immediate profits that can typically be earned from unsustainable mangrove land and resource uses. Most households in Mida Creek and the Tana Delta are simply unable to afford to bear these costs.

Linked to this, many **mangrove ecosystem values remain uncaptured** (3). For the main part, the off-site beneficiaries of mangrove ecosystem services receive these benefits at low or zero cost. There are significant leakages, in the sense that little or none of this value is returned as investments in the activities that are necessary to sustain mangroves, or to reward the groups that undertake them. Thus, it is mangrove-adjacent communities and conservation organisations which effectively subsidise the provision of valuable services to other groups and sectors. Underpinning these other issues, many of the **economic and business opportunities associated with mangrove ecosystem services remain untapped** (4). Aside from the currently small – but emerging – ecotourism sector (such as the mangrove boardwalk at Mida Creek), there has been relatively little attention paid to identifying, researching and developing "green" production, consumption, investment and job opportunities, or to mobilising the credit, funding and other support that is required to bring them into the mainstream. Much of the sustainable economic potential of mangrove ecosystem services is not being captured, meaning that potentially valuable income, employment and business opportunities – including, but not limited to, those that would further enhance food security and improve livelihoods – remain as yet unavailable and untapped.

Going forward, it is clear that any incentive mechanism for coastal ecosystem services that may be developed under the BGI must tackle these four, interrelated, issues. The key challenge thus becomes one of moving beyond merely articulating mangrove economic values, and going on to identify concrete instruments which will serve to better distribute and capture these values, while continuing to put local livelihoods at the centre of such efforts. As high as the local value of mangrove ecosystem services might be demonstrated to be on paper, this means little in practice unless it translates into tangible changes in the conditions and circumstances that drive people's day-to-day livelihood opportunities and economic decisions in mangrove areas. In a similar vein, as much as conservation and development decision-makers in Kilifi and Tana River Counties or Coast Province (or even at national and global levels) may be convinced that it is in the public interest to conserve mangroves in order to sustain the flow of ecosystem services they yield, this will have only minor impact until local people are fully-empowered to participate and benefit from these processes, and perceive there to be concrete gains from doing so.

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