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# Sustainable exploitation of the North Kenya Banks as an essential part of the Kenya Blue Economy Plan

SCIENCE INTO POLICY REVIEW

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## Key Messages:

The North Kenya Banks represent a rare extension of the East African continental shelf with mostly unrealized socioeconomic potential.

Efforts to expand marine capture fisheries onto the North Kenya Banks must confront the challenges of limited stock assessments, insufficient knowledge of ocean drivers of marine productivity and complications arising from transboundary shared stocks.

Existing management and governance of marine resources is fragmented and the effectiveness of existing policies if applied to the NKB region is unclear.

Kenya has one of the lowest marine fisheries catch rates of coastal African countries (Le Manach et al., 2015). It is believed that the North Kenya Banks (NKB) region, representing Kenya's broadest portion of the continental shelf, is a productive area that has considerable – if mostly unrealized – socio-economic potential. As a result, the Kenyan Government wants to expand domestic fishing into the NKB. However, the management and governance of these marine resources is fragmented and the effectiveness of existing policies is unclear.

Over the past three to five years progress has been made in understanding key environmental drivers and processes and the influences these have on marine productivity. However, there is, as yet, no evidence of substantial fish stocks on the NKB, and such evidence is essential to understand the real potential of this fisheries' contribution to the Blue Economy.

This policy brief is aimed at policymakers concerned with further developing Kenya's Blue Economy sector plan, in particular those who may view the NKB as a potential new frontier.

## Background

Kenya's marine fisheries consist of coastal inshore fisheries and are mostly artisanal and subsistence based. Artisanal fishermen, who have few other ways of ensuring a livelihood, tend to use small craft. This restricts fishing to Kenya's near-shore waters, which includes reefs, estuaries and lagoons. While the full potential of marine capture fisheries is unknown and there have been few stock assessment

surveys for Kenyan waters, most of its total marine products (80%) are caught in its coastal waters and reefs, with the rest caught offshore (Kamau et al., 2021).

Several biophysical factors, including the narrow continental shelf, low-productivity waters and seasonality, limit the productivity of Kenyan marine fisheries (NOC, 2018). Proximity to the coast, relative ease of access and the use of destructive fishing gear, combined with a lack of governance, have also resulted in the diminishment and degradation of near-shore fisheries in the country (Kamau et al., 2021).

In addition, offshore illegal, unregulated and unreported (IUU) fishing threatens industrial fishing in Kenya's waters, with an estimated loss of nearly US$100 million annually. As a result, eliminating IUU fishing in Kenya's waters has been prioritized in the country's Blue Economy strategy.

A very productive area known as the NKB can be found between 2–4°S and represents Kenya's broadest portion of the continental shelf covering approximately 4,325 km$^2$. There is increased focus on the NKB as an emerging fishery that could stimulate economic growth and improve livelihoods in local fishing communities. With better resources to ensure greater accessibility, this new frontier for food security could become an economically crucial fishery for the country (Jacobs et al., 2020a).

While there is interest in the NKB and increased understanding of the large-scale ocean dynamics that influence productivity in the region, stock assessment has been inadequate, with no region-specific management plan. This is compounded by the fact that collecting in situ measurements is problematic, owing to economic constraints and insecurity (Jacobs et al., 2020a). Ultimately, to ensure the sustainable exploitation of the NKB as an essential part of the Kenyan Blue Economy Plan, future research and management plan development must be seen as interlinked activities. Some (strategic) research activities should both be led by the management plan and inform its evolution.

## Kenya's policy landscape

Kenya's Constitution[1] makes provision for two levels of government – national government and 47 county governments[2] – with the duty to consult and cooperate.[3] The five coastal counties are Kwale, Mombasa, Kilifi, Lamu and Tana River (Wambu 2017). The territorial sea, exclusive economic zone (EEZ), continental shelf and land between the high- and low-water marks belong to the Kenyan people. This public land is held in trust by the national government and administered by the National Land Commission on behalf of all Kenyans. The

[1] See Kenya Law. *Constitution of Kenya, 2010*. http://kenyalaw.org/kl/index.php?id=398
[2] Ibid., Art. 6(1) and Schedule 1.
[3] Ibid., Art 6(2).

same applies to the natural resources found on or under the surface.[4] Kenya is a monist state, where the general rules of international law form part of the country's national law.

Kenya's fisheries resources can be grouped into coastal inshore fisheries, which support approximately 60 000 people (Kamau et al 2021), and offshore fisheries, which take place in its EEZ and predominantly consist of commercial and foreign vessels catching tuna and other migratory fish. Kenya's coastal zone and adjacent waters are protected by sectoral legislation, with overlapping mandates for coastal and ocean governance between various state departments and agencies.

The Fisheries Management and Development Act 2016 is the main legislation governing marine living resources (Wambua 2018). This Act sets out measures for the conservation, management and development of fisheries and other aquatic resources. It is aimed at improving the livelihoods of fisheries communities and provides guidance on importing and exporting fish and fish products, establishing fish quality and ensuring safety, among others.

Various other pieces of legislation relate to the governance of fisheries activities in Kenya (including small and medium pelagic fisheries), such as the Fisheries Act Cap 378 (1991) and the Wildlife (Conservation and Management) Act Cap 376 (Maina 2012). Several other national, regional and international legal frameworks and draft management plans cover the country's coastal fisheries (Maina 2012). Also of relevance are policy documents and acts such as the National Oceans and Fisheries Policy 2008 and the Prawn Fishery Management Plan 2010, Fisheries (Beach Management Units) Regulations 2007 and the Fisheries Act CAP 378, 1991.

Kenya's National Oceans and Fisheries Policy emphasizes the need to focus on offshore resources and to target new and under-exploited stocks for economic viability and resource sustainability.

### Box 1: Transboundary Fisheries

Kenya lies in the so-called tuna belt of the WIO region, and this migratory fishery further complicates the management regime, highlighting the need for regional agreements. Kenya is a member of the Indian Ocean Tuna Commission (IOTC), which shares fisheries data and information to assess stocks of specific species, and of the South West Indian Ocean Fisheries Commission, which manages other (non-tuna) trans-boundary fisheries resources.

The country also shares fisheries with Tanzania and Somalia, which have their own management and policy regimes. This only adds to the difficulties in managing the trans-boundary shared fisheries. To resolve these issues, the Kenyan and Tanzanian governments have begun to develop a coastal and marine trans-boundary conservation area (Kamau et al., 2021).

[4] Kenya Law. *Constitution of Kenya, 2010*. Articles 6(1)(2), 62(1)(j)-(l), 62(3), Art 260. http://www.kenyalaw.org:8181/exist/kenyalex/actview.xql?actid=Const2010

In addition, the 2013 draft Management Plan for Fisheries Targeting Small and Medium-Sized Pelagic Fish[5] sets out a national-level sectoral plan for fisheries, and is aimed at ensuring the long-term sustainability of artisanal pelagic fisheries. A rise in fishing activity and drop in catches have necessitated an urgent intervention in its management. The plan is anchored on the National Oceans and Fisheries Policy 2008.

The lack of a central national management plan, coupled with the surfeit of legislation, has resulted in various challenges to the effective management and growth of the sector (Kamau et al., 2021).

- There are numerous fish landing sites, which makes it difficult, time consuming and costly to monitor and collect data
- The EEZ has not been studied effectively, nor have fish stocks been regularly assessed, so the total fish stock and the maximum sustainable yield are poorly understood
- IUU fishing remains an issue; Distant Water Fishing Nations are guilty of uncontrolled fishing
- Artisanal fishing gear is destroyed by large commercial trawlers
- Artisanal fishers do not have the capacity to exploit offshore fish stocks
- There is not enough information about offshore marine fish stocks
- There are issues in terms of compliance and enforcement
- No management plan directly addresses small and medium pelagic fishery along the Kenyan coast

Although Kenya's fisheries hold considerable socio-economic potential, this is mostly unrealized. One reason for this is the dearth of research on offshore fisheries. This undermines already-inadequate marine management structures and supporting infrastructure (Kamau et al 2021).

Kenya has initiated various blue economy sector initiatives[6] including drafting a blue economy sector plan that includes the Kenya Marine Fisheries and Socio-Economic Development Project. This five-year World Bank project was launched in 2020 to improve the management of priority fisheries and mariculture, and to increase access to supporting livelihood activities in coastal communities. Kenya's blue economy sector strategy prioritizes marine fisheries, and intends to grow value and income across the value chain.

## A possible new frontier: The North Kenya Banks

During Africa's first Sustainable Blue Economy Conference, hosted by Kenya in 2018, President Uhuru Kenyatta noted in his address that Kenya's Blue Economy sector could easily triple its current contribution to the gross domestic product and create scores more jobs. The Kenyan government sees these fisheries as playing a major part in its Blue Economy sector strategy, especially the NKB area, as it is thought to hold considerable economic potential if properly managed and sustainably exploited.

[5] Available at: http://extwprlegs1.fao.org/docs/pdf/ken147842.pdf

[6] Work towards the blue economy is well underway in Kenya. In 2014 the Office of the President established the Blue Economy working group, and in May 2016 Kenya's State Department of Fisheries was renamed the State Department for Fisheries and the Blue Economy. In 2017 the government created the Presidential Blue Economy Task Force, and in 2018 Kenya organized a global Sustainable Blue Economy conference that resulted in the Nairobi Statement of Intent on Advancing Global Sustainable Blue Economy, available at Blue Economy Conference (n.d.). *Nairobi Statement of Intent on Advancing Global Sustainable Blue Economy*. http://www.blueeconomyconference.go.ke/wp-content/uploads/2018/12/Nairobi-Statement-of-Intent-Advancing-Global-Sustainable-Blue-Economy.pdf.

One of the commitments made during the conference was to ensure responsible and sustainable fishing to conserve endangered species and high-value stocks.[7]

Due to its considerable potential, the NKB could be an important vehicle in achieving the Kenya Vision 2030 development plan, which consists of five-year Medium-Term Plans (MTPs). The current plan is the MTP 2018–2022 (Kamau et al., 2021).

## Processes that impact productivity in the region

Viewing the NKB as a solution comes with its own issues, and it is important to establish whether the NKB can indeed be considered the 'next frontier' for food security and, if so, how it can be exploited safely. The exploitation of marine resources in the NKB necessitates their sustainable management and the adoption of a marine management framework.

There is no lack of interest in the NKB, and progress is also being made towards reaching an understanding of the dynamic ocean processes that drive and support this supposedly high fish abundance. Yet it is crucial to establish the region's annual, interannual and multidecadal variability. This means greater effort and further research are needed to do proper stock assessments and deepen understanding of the current state of the NKB ecosystem. More specific management plans also need to be developed. All of this requires investment and, importantly, further insight into the impact of the following processes on the NKB.

## Large-scale ocean dynamics

The NKB is impacted by multiple upwelling mechanisms that are highly variable in time and space, making this upwelling unusual. As critical controls on local productivity, these mechanisms could in turn have a significant socio-economic impact at a national level (Kamau et al., 2021). The upwelling is brought on by the convergence of the Somali Current and the East African Coastal Current during the Northeast Monsoon. While its position changes from year to year, it meets near the NKB and flows away from the coast. As a result, there is considerable variability in terms of the intensity, position and reach of productive waters. Several environmental controls thus have to be taken into account to guide the sustainable management and use of these resources in the face of such an erratic feature.

While previous studies have looked at the impact of El Niño and/or the Indian Ocean Dipole on the Indian Ocean and its ecosystems, their impact on regional upwelling systems is only partially documented. As yet, there has been no assessment of their influence on ocean circulation in the NKB and the resultant biological response (Jacobs et al., 2020b).

## Tana River nutrient input

Nutrient enrichment processes such as vertical mixing, coastal upwelling, tidal mixing, land-based runoff and freshwater input go hand in hand with global fisheries production. Riverine outflow has a significant influence on coastal ecosystems, mainly because of the temporal variability of the incoming river loads (Mutia et al 2021).

[7] Others were to accelerate the development of marine and inland fishery industries by increasing aquaculture, fish processing and storage capacities and related blue economy sector industries, as well as to combat IUU fishing. See Sustainable Blue Economy Conference (2018, November 26–28). *Summary of commitments*. http://www.blueeconomyconference.go.ke/wp-content/uploads/2018/12/FINAL-SBEC-COMMITMENTS-14-Decemebr-2018-4pm.pdf

Inshore of the NKB is Ungwana Bay – one of the most productive fishing grounds along the Kenyan coast. The Tana River discharges into Ungwana Bay, dispersing those nutrients associated with a high sediment input. The Tana is the longest river in the country and contributes about half of all river loads into Kenyan waters (Mutia et al., 2021). While it discharges a significant amount of nutrients and sediment, this has been affected by the hydroelectric dams built along it. As a consequence, the area is dynamic and complex, and the local environment can vary from being nutrient limited to light limited. Primary productivity can also be altered by freshwater stratification from the Tana River.

For the development of management plans and policies for offshore fisheries, in this instance the emerging NKB fishery, it is important to examine if the Tana River nutrient input also impacts the wider shelf's productivity (Mutia et al., 2021).

According to the latest research, the Tana's high nutrient input is limited to the coastal zone and can be delineated from the areas influenced by the oceanic process by a simple algorithm applied to satellite data (Mutia et al., 2021).

## Impact of climate change: warmer water

Existing local stressors are exacerbated by the impacts of climate change, yet too few studies examine how these impacts might affect the living marine resources of the tropical Western Indian Ocean littoral zone (Jacobs et al., 2021). Anthropogenic climate change is causing the Western Indian Ocean to warm, with evidence suggesting that future ocean productivity will drop. It is unclear how this general trend will be modified by the dynamics of the highly variable NKB upwelling, since climate models still cannot resolve this crucial feature of the region. It is also unclear how the ecosystem of the NKB will respond to a warming ocean. Future warming of the NKB waters might influence the NKB fishery, and the impact of this on the species must be determined (Mwaluma et al., 2021).

It is therefore important to understand how marine ecosystems in the region will be affected by climate change when developing management and adaptation plans and policies. Extensive oceanographic and fisheries studies are required to fill the research gap. To this end, the Intergovernmental Panel on Climate Change has identified centennial-scale trends in the impact of climate change on the tropics, but regional policy plans seldom allow for such long timescales (Kamau et al., 2021). Policymakers will have to consider short-term environmental fluctuations while designing policies to adapt to the longer-term background trends of climate change.

High-quality fisheries data should thus be analysed in the context of the seasonal and interannual dynamics of the major driving factors, in order to understand how the socio-ecological system will be impacted by climate change. Future work needs to continue examining the roles of seasonally reversing monsoon currents and associated upwelling systems, as well as the causes of variability within the NKB upwelling. Urgent investment should be made in improving fisheries records in the region to better facilitate climate change adaptation and risk management in existing and new fisheries (Kamau et al., 2021).

## Conclusion

The NKB is an emerging fishery of considerable national interest. Policymakers are increasingly making it a focus of their attention, as are stakeholders involved in the further development of the blue economy sector plan.

While there is growing understanding of the key environmental processes that drive the complex system, stock assessment is still lacking and more research should be conducted on the spatial and temporal distribution of pelagic fisheries and the impact of environmental drivers.

Much has been done at the policy level and a feasible policy framework is now in place, but it still needs to be refined. Notably, Kenya's existing legislation should be scrutinised and specific management plans developed for the fish stock of the NKB. This requires the adoption of a marine management framework that addresses the status of current knowledge and identified gaps in order to determine baseline conditions and improve forecasting. In addition, management plans must include oversight over gear restrictions, closed seasons, establishment of community-managed areas in the vicinity of the NKB, etc (Mwaluma et al., 2021).

It is also important that a clear communication strategy is developed based on effective stakeholder engagement and communication with coastal communities (Kamau et al., 2021).

At the same time, infrastructure investment is needed to establish a high-value chain (e.g. access to a high-quality product-to-export market). This requires an NKB business plan. Crucially, an entity must be identified to coordinate all of the above and monitor implementation.

## Recommendations

**General recommendations:**

1. Acknowledge that the NKB region is a critical area for realising the ambitions of Kenya Vision 2030 in terms of developing the Kenyan blue economy and its plans to benefit from marine and fisheries resources in the Kenyan EEZ (**Box 2**).
2. Develop a Spatial Management Plan for the NKB area acknowledging the interests of the multiple users of marine resources and ecosystem services. Recognize this area in the National Spatial Plan outlined in Kenya Vision 2030 and in the blue economy sector plan.
3. Recognize the NKB as a domain where productivity is driven by the seasonal upwelling system – usually occurring from December to February – in contrast to the near-coastal zone, where productivity is driven by the Tana River outflow and where terrestrial impacts (i.e. pollution) will be greatest (Box 3).
4. Recognize the highly variable nature of this upwelling system, which is the primary driver of ocean productivity and hence good fish recruitment, and which changes its intensity and location from year to year (Box 4).
5. Recognize marine fisheries' potential for national food security. Put in place a national strategy for sustainable development of the NKB using an ecosystem approach to fisheries to extract the maximum value.
6. Prioritize the need to predict "good" and "bad" years and therefore for real-time analysis of remote sensing data to inform operational decisions about the emerging fishery in the NKB on a seasonal scale.

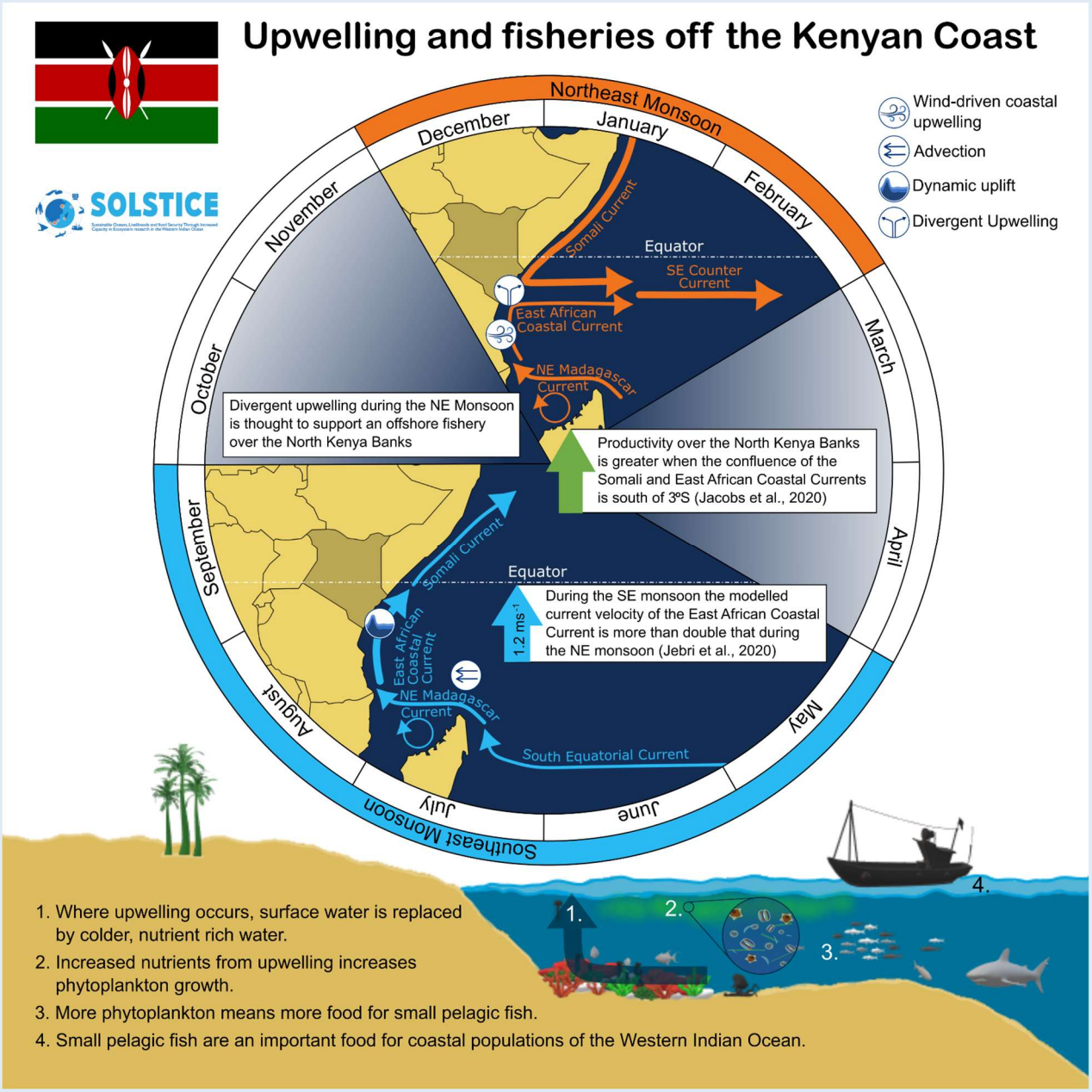
### Box 2: Kenya Vision 2030 and the Blue Economy

Kenya Vision 2030 is the national long-term development strategy that seeks to transform Kenya into a globally competitive middle-income country with a high-quality of life for all Kenyans by 2030.

Sustainable utilization of Kenya's marine resources for economic development (the Blue Economy) is seen as a key enabler of the Kenya Vision 2030 strategy.

7. Optimize investment in infrastructure to enhance the value chain for fisheries, if their benefit to the economy is to be maximized. In planning decadal or multi-decadal scale investment, consider the forthcoming decline of ecosystems and fisheries yields driven by the accelerating impacts of climate change (Box 5).

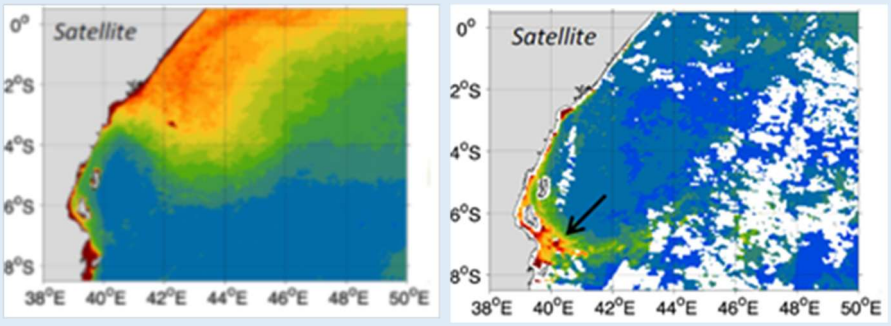
## Box 3: North Kenya Banks Upwelling




The seasonal upwelling of cold nutrient rich water at the North Kenya Banks stimulates plankton growth in surface waters. These productive periods provide food for small pelagic fish which are themselves an important food source for coastal communities. Productive small pelagic fisheries are also of significance to migratory species such as tuna, with Kenyan waters contributing to total Western Indian Ocean tuna catch.

## Box 4: Impact of 1997/98 El Nino on NKB upwelling

The position and strength of upwelling at the NKB varies year-to-year in response to changes in atmospheric and oceanic forcing. During the strong El Nino event in 1998 seasonal upwelling moved south away from the NKB and into Tanzania's EEZ resulting in the lowest observed chlorophyll concentrations to date over the NKB. The likely negative impacts on local fish stocks have the potential to negatively impact fisher's livelihoods and food security.



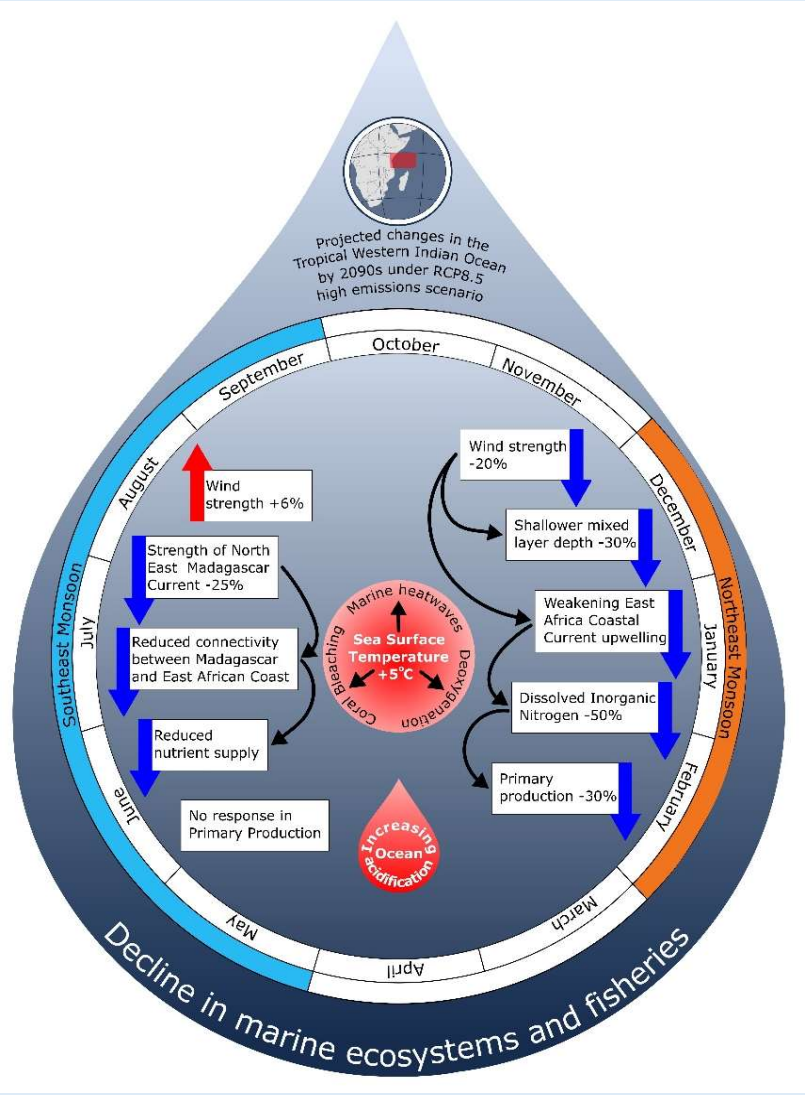

**Left:** Climatological mean chlorophyll distribution for the period 1998-2015 showing high chlorophyll over NKB.

**Right:** Distribution during 1998 El Nino. Enhanced chlorophyll off Tanzania indicated by arrow.

**Additional recommendations** for the national fisheries in the context of the emerging area of the NKB as the next frontier for food security:

1. Recognize that expanding a fishery offshore equates to creating new fishing opportunities that have to cope with strong environmental variability without relevant previous experience. This variability is key in controlling recruitment and retention of major commercial species, and it takes time to develop skills in recognizing and adapting to it.
2. Conduct stock assessments and improve reporting on catches by national and foreign vessels. Interpret the data in the context of the state of the upwelling feature.
3. Develop risk-based management approaches to cope with "good" and "bad" years for productivity and fisheries yields. Establish management mechanisms that protect stocks from overfishing during the bad years, as well as the livelihoods of all actors involved.
4. Recognize that, in addition to local fishers, fishing fleets are likely to comprise larger vessels not landing locally. Thus, to extract the maximum value for the blue economy, establish the management of the NKB area under the primary responsibility of the National Government, with the responsibility for data collection devolved to local and regional players (where local and regional participation exists).
5. Recognize the strong connectivity of the Kenyan EEZ to the EEZs of Somalia and Tanzania as well as the high seas, resulting in its significant exposure and vulnerability to extraction activities and fisheries management in these areas.
6. Hold bilateral meetings with regional fisheries management organizations such as the IOTC to discuss data requirements and regional quota allocations of key resources like tuna and similar species

## Box 5: Anticipated impacts of climate change along the path of the EACC




The Western Indian Ocean is one of the fastest warming regions of the ocean. The impacts of this climate driven warming are already evident with increases in the frequency and magnitude of coral bleaching events in the WIO region linked to increased occurrence of marine heat waves. For the EACC region projected impacts of climate change over the 21st century include a wide-spread warming of up to 5°C with year-long marine heat waves arriving as soon as the 2030's. Weaker wind strength particularly during the northeast monsoon will likely lead to reduced nutrient supply and weaker marine productivity with the potential to reduce fisheries. Conditions during the southeast monsoon will likely also result in weaker nutrient supply, though marine primary production appears more stable.

**Additional recommendation for the Indian Ocean Tuna Commission (IOTC)**:

1. Acknowledge the growing ambition of the Kenyan blue economy to exploit marine fisheries resources in the whole of its EEZ.
2. Recognize the importance of the NKB upwelling feature to the migratory fish species of the WIO region.
3. Recognize the variability in the location and intensity of the upwelling from year to year and the impact of this variability on both Kenyan and Tanzanian local and migratory fish species.

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