



## Resource Mobilisation for Biodiversity Conservation

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POLICY BRIEF 3

# KEY ECOSYSTEM SERVICES IN NAMIBIA

## ECOSYSTEM SERVICES PROVIDE BENEFITS THAT ARE ULTIMATELY USED AND ENJOYED BY PEOPLE, AND CONSEQUENTLY AFFECT HUMAN WELL-BEING

### INVENTORY OF ECOSYSTEM SERVICES IN NAMIBIA

- Namibia's key ecosystem services include livestock, ground and surface water, fish, soil formation and composition, chemical condition of fresh and saltwater, global and regional climate regulation, tourism and recreation, and spiritual interactions.
- Many of these services are facing pressure from habitat change, pollution, invasive species, climate change, illegal use, and exploitation.
- As ecosystem services provide benefits for humans, their degradation comes at a cost and reduces the nation's wealth and wellbeing.
- Ecosystem services should be therefore be mainstreamed into policy and decision making by public, corporate and private entities.

### THE ECOSYSTEM SERVICES APPROACH

Over the course of the 20th Century, humans have extensively and rapidly changed ecosystems in a way that has diminished their capacity to deliver services. An estimated 60 percent of ecosystem services are being degraded or used unsustainably (Millennium Ecosystem Assessment - MA).

Ecosystem services provide benefits that are ultimately used and enjoyed by people, and consequently affect human wellbeing. According to the Common International Classification of Ecosystem Services (CICES) there are three broad categories: **provisioning, regulation and maintenance, and cultural services.**

The ecosystem services framework is useful for identifying environmental issues which are of high priority for society, as well as demonstrating the importance of environmental issues to policy and decision makers.

The *Inventory of Ecosystem Services* in Namibia identifies ecosystem services in Namibia, assesses trends in the delivery of these ecosystem services and the drivers of change affecting their delivery, and prioritises ecosystem services for mainstreaming into decision making.

#### Key ecosystem services in Namibia include:

- **Provisioning:** livestock, ground and surface water, fish, plants for material and energy use.
- **Regulation and maintenance:** soil formation and composition, chemical condition of fresh and salt water, maintaining nursery populations and habitats, climate regulation.
- **Cultural:** wildlife viewing and other recreation/tourism, scientific, sacred, and bequest services.

### PRESSURES AND KEY DRIVERS OF CHANGE IN NAMIBIA

- Exploitation: e.g. abstraction of groundwater, fisheries
- Invasive species: e.g. Prosopis in riverbeds
- Habitat change: e.g. land degradation, bush encroachment
- Climate change: e.g. changes in patterns of precipitation
- Pollution: e.g. industrial effluents
- Illegal use: e.g. poaching



## ECOSYSTEM SERVICES

Ecosystem services are identified and categorised at the level of each individual ecosystem zone.



Provisioning ecosystem services – provision of dairy products

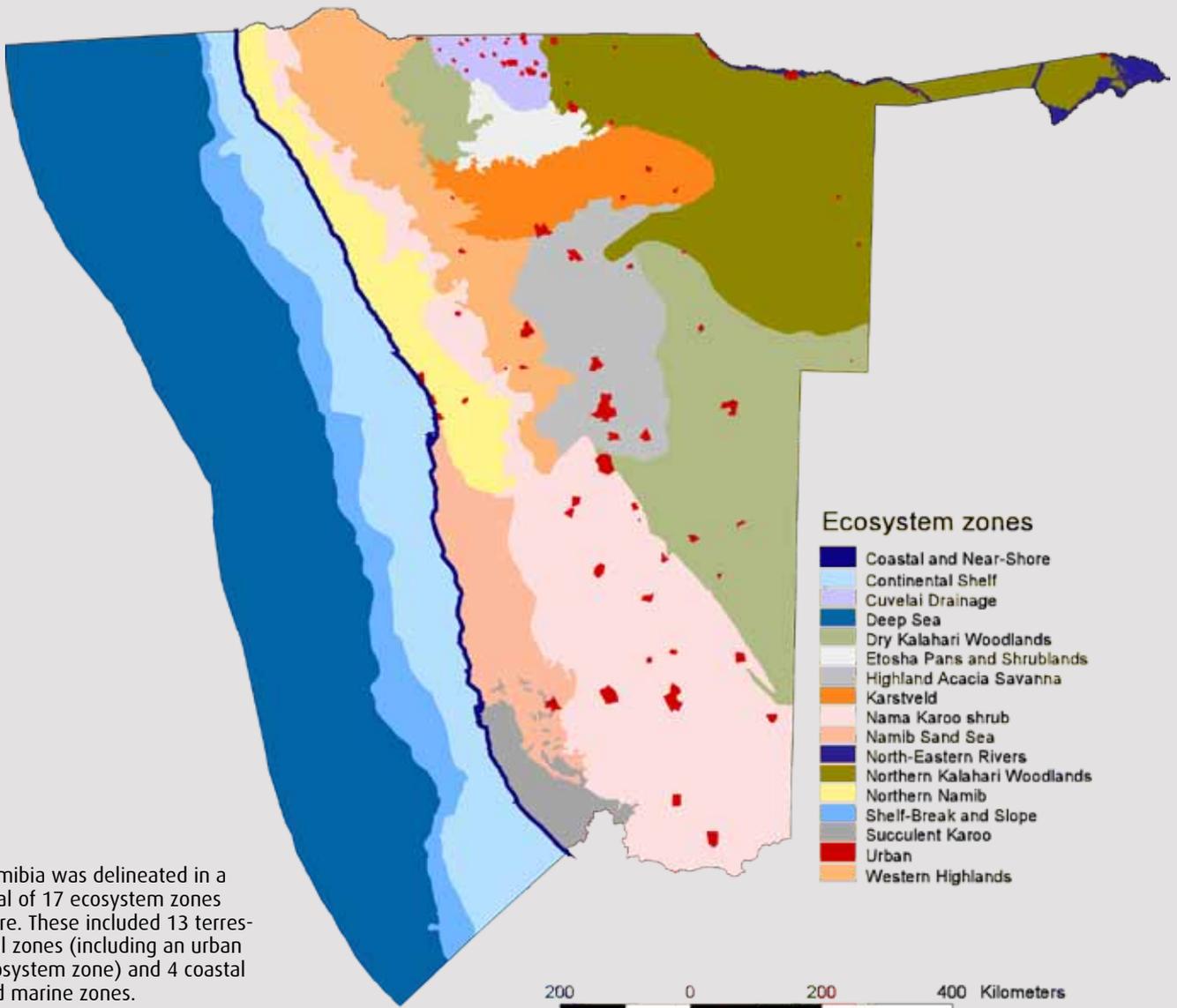


Regulation and maintenance ecosystem services – maintenance of chemical condition of freshwater



Cultural ecosystem services – wildlife viewing

## ECOSYSTEM ZONES



Namibia was delineated in a total of 17 ecosystem zones. These included 13 terrestrial zones (including an urban ecosystem zone) and 4 coastal and marine zones.



## FLOWS OF ECOSYSTEM SERVICES

The Inventory describes the trends in the flows of ecosystem services and the impacts from drivers of change for each ecosystem zone. Summaries of the terrestrial zones and coastal and marine zones are shown below.

**Habitat change** has negatively impacted **soil formation and composition and erosion control and flood protection**, largely due to land degradation caused by overgrazing, bush encroachment and loss of woodland. This is expected to continue, which could diminish the capacity of the land to deliver provisioning services relating to livestock and crops. **Groundwater recharge**, has also been negatively impacted, largely via bush encroachment, which reduces the water available for domestic, agricultural, and industry use.

**Pollution** is expected to continue to undermine the **chemical condition of freshwaters**, particularly in ecosystem zones with perennial rivers. **Climate change** may have already had a negative effect on **groundwater recharge** (if higher carbon dioxide levels have increased the rate of bush encroachment), and we expect that it will detract from groundwater recharge in the future if it increases aridity and/or changes precipitation patterns. The services relating to **global and regional climate regulation** and **ventilation and transpiration** are generally not well understood.

The flow of cultural services relating to **physical interactions** has increased significantly over the past 50 years, primarily as a result of increased tourism and recreation (**exploitation**). This trend is expected to continue into the future. The effects of **habitat change, pollution and illegal use** (e.g. poaching) on these services are unclear. They generally represent negative pressures but they are not necessarily significant enough to affect the delivery of services. Services relating to **spiritual, symbolic and intellectual interactions** are generally not well understood, and the effects of the different pressures are unknown.

### Key results: terrestrial ecosystem zones

The flows of all identified provisioning services have increased over the past 50 years, with those relating to **livestock** (primarily cattle farming and keeping), **plants for material and energy use** (particularly firewood), and **surface water** (for both drinking and non-drinking uses) increasing most significantly. This has been driven by greater **exploitation**, due to increased human populations and per capita consumption of these services. **Habitat change** has had a negative impact on livestock and **groundwater** over the past 50 years, largely due to land degradation and bush encroachment.

**Exploitation** is expected to remain an upward pressure on the flows of almost all provisioning services in the future, but **habitat change** will impede flows of **cultivated crops, livestock and groundwater**. Furthermore, if **climate change** increases aridity, it is expected to have a negative impact on both **cultivated crops and livestock** via a reduction in the productivity of land used to deliver these services; however the extent of this negative impact is unknown.

The flows of most regulating services have either been trending downwards over the past 50 years, or are unknown. However, the **mediation of waste and pollution** has increased in line with greater pollution and the **maintenance of nursery populations and habitats** has increased significantly, supporting the recovery of wildlife numbers.

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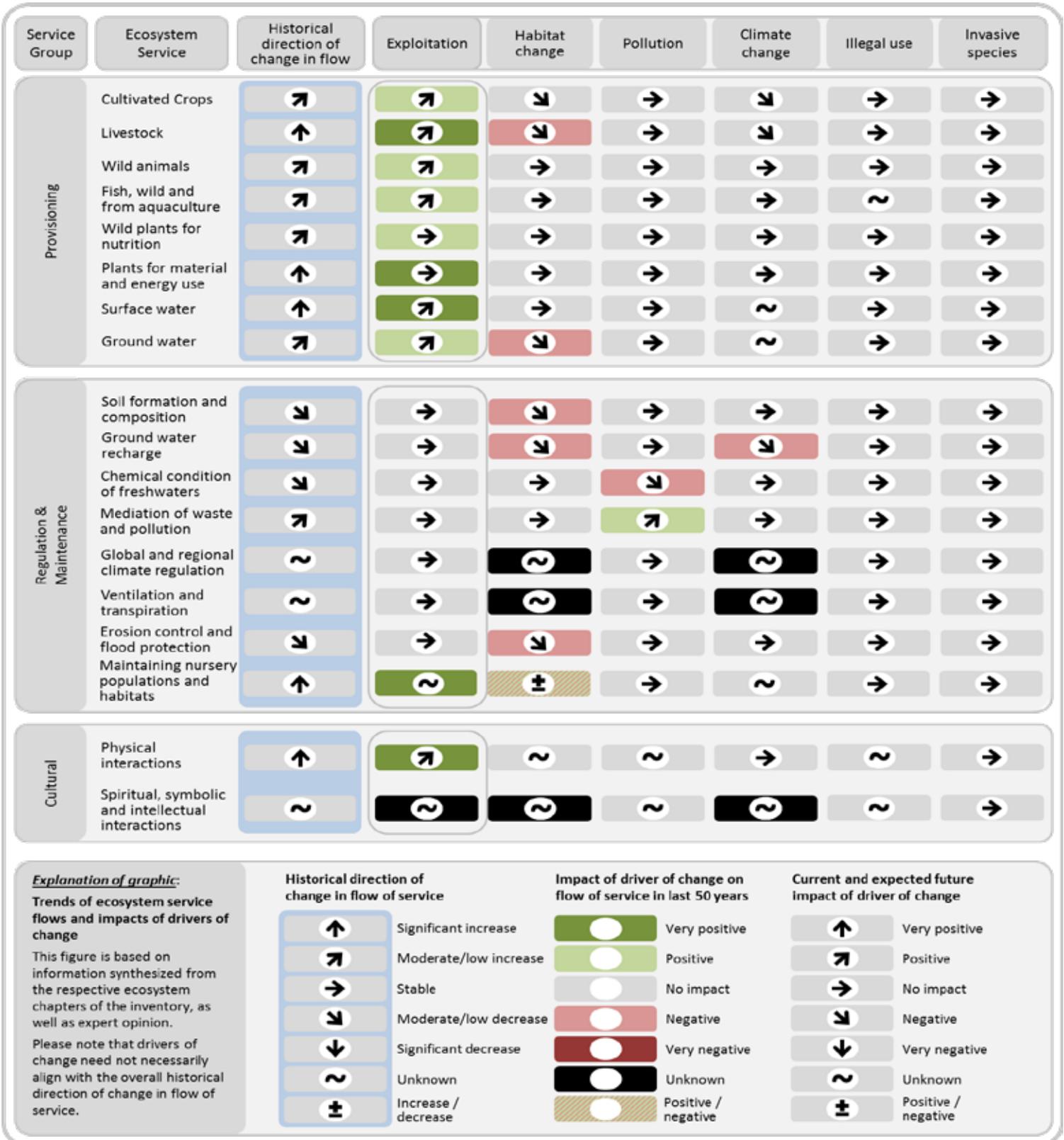
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Habitat change has negatively impacted the terrestrial ecosystem zones



## TERRESTRIAL ECOSYSTEM ZONES



### Key results: Coastal and marine ecosystem zones

The major provisioning service is **fish for food**. Although different species of fish have seen their flows increase and decrease, the overall trend in the service over the past 50 years has been strongly negative, primarily as a result of **overexploitation of the small pelagic fish** and the knock-on impacts on other fish species (such as hake). There are expected to be mixed impacts from **exploitation on different fish species** going forwards, depending on current stocks and whether harvest rates are sustainable. The **effect of illegal use** differs by species and the **effect of habitat change** is unknown.



The **flow of wild plants for nutrition** (e.g. seaweed) has declined due to a reduction in demand while **plants for agriculture and mariculture** (e.g. guano for fertiliser and kelp for abalone farming) have experienced mixed effects, although the flow is expected to increase in the future due to **exploitation**.

Of the regulation and maintenance services, the **chemical condition of saltwaters** has declined, largely as a result of **pollution** (which has resulted in increasing flows of the **mediation of waste and pollution services**). The ongoing **impacts of pollution** are not clear as it is unknown if pollution levels will increase or decrease. **Climate change** may also impact on these services, but its extent is unclear.

The **maintenance of nursery populations and habitats** has decreased significantly, primarily with regard to the effects on juveniles of the hake stock from the **overexploitation of the**

**small pelagic fish stocks** and other fishing practices (**habitat change**). The ongoing impacts of these are unclear, as are the effects of climate change. Coastal breeding habitats of seabirds have also been negatively impacted by **habitat change**. The flows of the **erosion control and flood protection** and **global and regional climate regulation** services are largely unknown.

As in the terrestrial ecosystem zones, recreational tourism and consequently cultural services relating to **physical interactions**, have increased significantly over the past 50 years. This is as a result of increased exploitation, which is expected to continue growing. There have also been increases in **scientific, educational, entertainment and aesthetic services**.

Services relating to **spiritual, symbolic and intellectual interactions** are generally not well understood.

## COASTAL AND MARINE ECOSYSTEM ZONES

Service Group	Ecosystem Service	Historical direction of change in flow	Exploitation	Habitat change	Pollution	Climate change	Illegal use	Invasive species
Provisioning	Fish	↙	⊕	?	→	↘	⊕	→
	Plants for nutrition	↘	?	→	→	↘	→	→
	Plants for agriculture/mariculture	⊕	↖	→	→	→	→	→
Regulation & Maintenance	Erosion control and flood protection	?	→	?	→	?	→	→
	Chemical condition of saltwaters	↘	→	?	?	?	→	→
	Mediation of waste and pollution	↖	→	→	?	→	→	→
	Global and regional climate regulation	?	→	→	→	?	→	→
	Maintaining nursery populations and habitats	↙	→	?	→	?	→	→
Cultural	Physical interactions	↑	↖	?	?	→	→	→
	Spiritual, symbolic and intellectual interactions	?	?	?	?	?	→	→

### Explanation of graphic:

#### Trends of ecosystem service flows and impacts of drivers of change

This figure is based on information synthesized from the respective ecosystem chapters of the inventory, as well as expert opinion.

Please note that drivers of change need not necessarily align with the overall historical direction of change in flow of service.

#### Historical direction of change in flow of service

↑	Significant increase
↗	Moderate/low increase
→	Stable
↘	Moderate/low decrease
↙	Significant decrease
?	Unknown
⊕	Increase / decrease

#### Impact of driver of change on flow of service in last 50 years

●	Very positive
●	Positive
●	No impact
●	Negative
●	Very negative
●	Unknown
●	Positive / negative

#### Current and expected future impact of driver of change

↑	Very positive
↗	Positive
→	No impact
↘	Negative
↙	Very negative
?	Unknown
⊕	Positive / negative



Economic valuation of services to be incorporated into ecosystems policy and decisions

## COST-BENEFIT ANALYSIS (CBA)

CBA is used to determine whether a policy or action results in a net benefit or has a positive return. This can then be compared with the status quo or alternative policies or actions. Environmental impacts of policies or actions are often not included in financial terms in the analysis, which means that they are essentially valued at zero.

Ecosystem services valuation is a means of monetising the environmental impact so that it can be included in CBA. For example, two possible water supply options may incur differing direct financial costs, in terms of infrastructure (e.g. pipelines), operations (e.g. labour), and maintenance. However, they may also have differing environmental impacts by reducing downstream flows, affecting the chemical condition of the water source, or overexploiting the source. Monetising and including these impacts in CBA results in a more complete and accurate picture of the costs and benefits involved.

## CALL FOR ACTION

The ecosystem services framework is useful in identifying environmental issues which need to be addressed, as well as demonstrating their importance. It provides a foundation for the mainstreaming of ecosystem services into policy and decision making by public, corporate and private entities. This can promote better environmental management, biodiversity conservation, and the sustainable use of natural resources, and facilitate the harmonisation of the environment and the economy.

## POLICY MAKING

Degradation and damage to ecosystems compromises their services and undermines their ability to provide benefits for people. Ecosystem services are crucial for wellbeing and economic and social development. This is why they need to be mainstreamed into policy making.

The valuation of ecosystem services can shine a light on how our economic activities and other actions affect them and make explicit the costs of degradation and the benefits of conservation. This can draw attention to environmental issues that need to be addressed and facilitate better policy making.

It is also important to incorporate ecosystem services into national development plans. One of the weaknesses of NDP4 was the lack of focus on the environment. NDP5, to be launched in April 2017, offers an opportunity to incorporate ecosystem services and support the nation's natural wealth.

## THE WAY FORWARD

One way of incorporating ecosystem services into policy and decision making is to undertake economic valuations of these services. For example, including the value of ecosystem services and their benefits into urban planning could help to ensure that environmental concerns are taken into consideration and any potential issues limited during the growth of urban areas. Where possible, economic valuations can attribute monetary values to services, while emphasising their linkages with other ecosystem services, especially those for which it is often not possible or appropriate to attribute a monetary value.

The full report is available on our website: [www.resmob.org](http://www.resmob.org)

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