

Target 9 Invasive species Assignment

Invasive and Alien Species (IAS)

Invasive species is defined as a species which is native or alien to the ecosystem and whose presence in the ecology causes or is likely to cause economic or environmental harm, or harm to human health, or animal health, or plant health. On the other hand, the invasive alien species are those that produce fertile off-springs in large numbers at a distance from their original ecosystem, compete with native species, destabilize the ecosystem, get naturalized over there and cause economic damage. The organisms pose threats to the value chains of biodiversity particularly fisheries, aquatic mammals and agricultural biodiversity.

SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and halt biodiversity loss

By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species

Key challenges

The range of these typical pests in the Gambia is wide, and should consequently require management. If an animal, plant, or micro-organism moves into a new ecology, it can affect the resident species in many different ways. New species can parasitize or predate upon residents, hybridize with them, compete with them for food, space, water and sunlight, bring unfamiliar complications such as diseases, modify habitats, or disrupt important interactions.

In The Gambia, the invasive alien species have a range of impacts on native biodiversity including competition with the native taxa of flora and fauna, hybridization with genetically close species, alteration of the physical and chemical characteristics of soil, modification of natural and semi-natural habitats and propagation of pests and diseases. These species cause huge problems to indigenous and local communities, with particularly significant negative effects on their local and national economies. Species that are invasive in certain parts of the country have caused severe negative impacts on such areas.

Gambia River Basin

The Gambia River basin hosts a great number of species and attracts many other species such as birds. This is due to the many services it provides but also because of its diversity of habitats (estuaries, marshes, swamps, mudflats, etc.). A habitat is a functional unit composed of different species that interact between them. The species are of great importance in maintaining the balance of habitats. These species, some of which are referred to as "keystone species", are essential in maintaining one or more communities. A keystone species may well be regarded as a species whose loss or elimination can cause a major change in the ecosystem. For instance, regarding plant species, they provide food for some animal species which are keystone species.

The importance of keystone species is not illustrated by the size of their current population, but rather by the action they undertake to maintain a given community. Their disappearance leads to significant changes in the functioning of the ecosystem. Similarly, species that are prolific in nature and can be considered as key species is particularly true for invasive species. In conservation biology, the term bio-indicator species is used to refer to species whose presence or change in their populations lead to changes in the environment or communities of other species. Keystone species play a fundamental role in maintaining biodiversity. Therefore, these species may act as biological indicators or bio-indicators and enable us to determine the state of the ecosystem. Key habitats are habitats which are important so much

so that their degradation or loss can affect one or more communities. According to Branquart (2004) key habitats are forest habitats that have a Preliminary Plan for Freshwater Biodiversity Monitoring in the Gambia river basin particularly high protective value (or wealth), because they host many rare and endangered species. Key habitats deserve to benefit from specific protection measures as regards their high protective value.

Pressures and threats

Pressures and threats to freshwater ecosystems are due to human activities such as poor land-use practices as a result of logging, burning and mining; catchment alteration primarily for irrigation, pollution from urban areas, industry and mines; and invasion of exotic species such as water hyacinth (*Eichhornia crassipes*) and tilapia (*Oreochromis mossambica*), the introduced fish species. Poor agricultural and mining practices often result in loss of riparian habitat, erosion of soil and increased turbidity, which may disrupt feeding success of fishes.

Weirs reduce or block flow to the extent that lower reaches of waterways can no longer support aquatic life. They also impede access to migratory species such as eels and amphidromous species that migrate between fresh- and salt-water habitats, which lose their migratory paths and cannot complete their life cycles. Around urban centres, untreated industrial chemicals from increased agricultural practices are often washed into the water by heavy commercial exploitation has rarely been sustainable.

Mangrove Ecosystem

Background and relevance of indicator Mangroves are one of the vitally important coastal ecosystems of the region. Their complex root structures allow them to survive the roughest of weather and to protect coastal communities from coastal erosion. They also provide nursery and feeding grounds for fish and other marine animals that occur in the islands along the length and breadth of river Gambia rely on for food security and income. This indicator assesses key pressures and threats to mangrove ecosystems in the Gambia.

Species detrimental to other species

For example, the mongoose threatens endemic species on reeds-growing islands. They have caused the population demise or extinction of many endemic vertebrates, and continue to cause livestock damage while posing a disease risk. Growing global trade and communication are directly contributing to the mixing of wildlife across biogeographically boundaries.

Increasing realization of the ecological costs of biological invasion

Species that appear in new environments may fail to survive but often they thrive, and become invasive. In fact, native species are likely to be unprepared to defend themselves against the invaders. This process, together with habitat destruction, has been a major cause of extinction of native species throughout the world in the past few hundred years.

Although in the past many of these losses have gone unrecorded, today, there is an increasing realization of the ecological costs of biological invasion in terms of irretrievable loss of native biodiversity.

Linkages to the UN Sustainable Development Goals

According to the World Conservation Union, invasive alien species are the second most significant threat to biodiversity, after habitat loss. In their new ecosystems, invasive alien species become predators, competitors, parasites, hybridizers, and diseases of our native and domesticated plants and animals. The Gambia has begun to experience the appearance of invasive and alien species that have significantly impacted particularly the horticultural productions. Currently, fruit trees are under huge threats posed by fruit flies and mealy bugs.

Yields and qualities of mangoes, guavas, sour and sweet sops and citrus have gone down as a result of the outbreak of these pests. The vegetables, on the other hand, are equally affected by several invasive and alien pests which are causing huge negative impact to vegetable production. Many vegetable crops such as the *solanaceous* crops (tomato, bitter tomato and eggplant), cabbage and other vegetables have significantly suffered from the red spider mites.

Effects: immense, insidious, and irreversible

IUCN, the World Conservation Union, states that the impacts of alien invasive species are immense, insidious, and usually irreversible. They may be as damaging to native species and ecosystems on a global scale as the loss and degradation of habitats.

Hundreds of extinctions have been caused by invasive alien species. The ecological cost is the irretrievable loss of native species and ecosystems. Invasive species are plants or animals that do not belong where humans have intentionally or accidentally brought them.

Assessing National Contributions to Achieving ABT 9

Invasive Alien Species (IAS) are currently considered as the second leading cause of extinctions of documented species and the third threat coming for species at risk of extinction. Invasive alien species can impact on the biodiversity at genetic, species and ecosystemic scales, but also on the community level, inducing effects on their structure and composition by hybridization between an introduced species and native species via gene transfer, predation, competition, transmission of pathogens and parasites.

Impacts on the ecological functioning of ecosystems: It is a modification of the food chain, changes runoff and sedimentation, overdrive evaporation of surface water. Impacts on human health and security as disease vectors, or may cause skin burns.

Socio-economic impacts: Among these impacts we can quote: loss of production for some industries (down fisheries or aquaculture production) because of "aquatic weeds", loss due to the costs of prevention and fight against these invasive plants, a reduction in the availability and accessibility of water for industries, block vents pipes or vents exhaust or intake, a physical nuisance for fishing, an obstacle to navigation, a penetration in flooded rice fields. Furthermore, it is important to emphasize that the immediate impact is to put into perspective the impact coming with the requirement of a medium to long-term management, which can be also called "deferred impacts".

Invasive plants often form dense canopies (herbaceous cover, cover creepers, thickets and forests known single species is to say composed of a single species) that smother native vegetation and remove native and endemic plants. They also affect the functioning of the ecosystem by promoting soil erosion, causing impoverishment and drying, increasing the risk of fires, decreasing the light that reaches the ground. Some species are harmful for crops, pasture, and forest have a significant socioeconomic impact (referred as "pests" or "plant pests"). There are other species present only in our gardens and are known to be

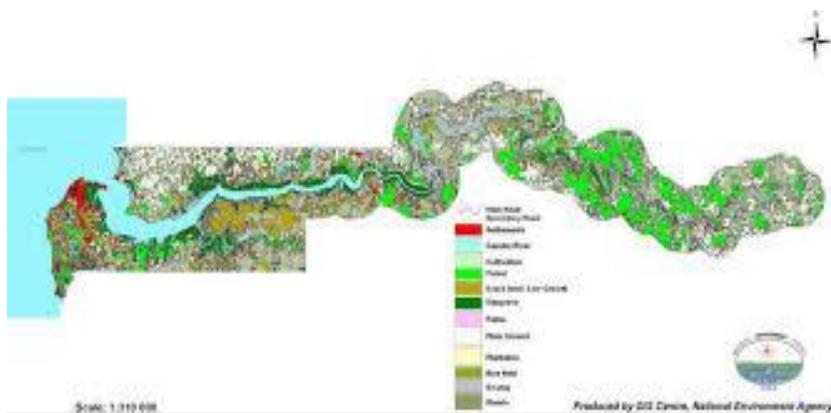
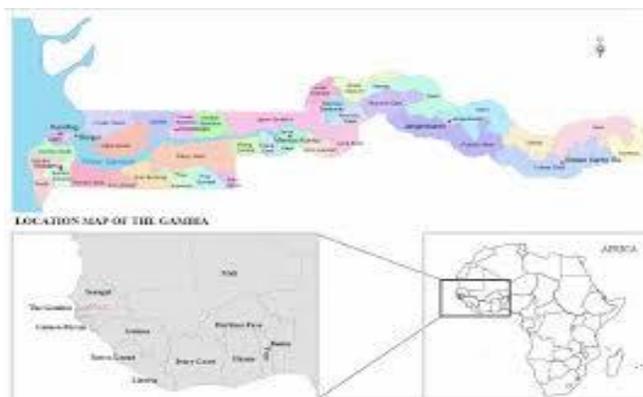
extremely invasive plants in other islands or regions. These are potentially invasive plants, kinds of "time bombs" that should be eliminated quickly before they can expand.

These plants called sub spontaneous should be paid a special attention.

Fight against invasive plants: To fight against an invasive species, it's important to know the biology, ecology and habitat and to set achievable goals on a small scale. In some cases, biological control is possible. The fight against invasive species is most effective when it occurs early in the invasion. As long as a proliferation is limited, it is possible to envisage eradication. Eradication means the total elimination of the species in a given area. If an invasion has gained ground, the eradication would not be possible.

Only the control of the species might be therefore considered. There are various ways of controlling invasive plants. The choice of methods to be used is to be determined in a diagnosis considering the history of the invasion, population flows, ecological, heritage interest, the use of the invaded area and management objectives. Thus, three main types of control are available: manual and mechanical control, chemical and biological control, or in some preferred situations, combinations of two or more of these techniques called "integrated control".

Map indicating the alien invasive plants and animal occurrence



Extents of priority IAS controlled or eradicated

Aim to ensure resilience of marine and coastal ecosystems through strengthened capacities and investment in prevention, detection, control and management of Invasive Alien Species. The program also seeks to promote gender equality and women's empowerment, to the extent relevant and feasible within the scope of the controlled or eradication of Invasive Alien Species. In order to achieve the project objective, and address the barriers, the project's intervention has been organized into three components

- Effective national policy framework on marine Invasive Alien Species
- Capacity building, knowledge and information sharing systems to address the IAS threats
- Investment in sustainable management, prevention, eradication, and control of IAS and restoration of IAS- degraded habitat at key marine and coastal areas

Effective national policy framework on marine Invasive Alien Species

- Regulations on introduction, early detection, prevention and management of IAS in marine and coastal wetland ecosystems developed and submitted for adoption.
- Main pathway and vectors for IAS identified
- Protocols and quarantine mechanisms consistent with bio-security requirements and international standards for IAS in marine and coastal wetland ecosystems in place
- Fiscal incentives introduced for effective removal of IAS (e.g. water hyacinths) in marine and coastal wetland ecosystems.
- Regulations and standards on control, minimization and removal of IAS from water developed jointly with MECCNR and put for enforcement

Sustainability and Replication mechanism: National Strategy and Action Plan on IAS in marine and coastal wetland ecosystems developed and approved to inform future actions on identifying priority habitats and species to be protected, evaluating financial and socio-economic effects of action/inaction for marine and freshwater IAS based on a thorough cost/benefit analysis.

Capacity building, knowledge and information sharing systems to address the IAS threats

- Inter-sectoral multi-stakeholder Advisory Technical committee under Ministry of Agriculture with increased capacity to deal with IAS prevention, early detection, rapid response, management and eradication
- Information system with official list of prohibited IAS, modules on risk analysis, early warning response and monitoring for IAS in marine and coastal ecosystems is in use by government regulators. The system enables a comprehensive inventory and monitoring of IAS threats at the most sensitive marine and coastal habitats and species (, sea turtles, mussel, oyster), as well as measures to detect and prevent entry of risky IAS at key points of entry.
- Engagement with shipping industry, and transport and customs sectors, on implementation of regulations and standards on control, minimization and removal of IAS from water; and on procedures for regulating the entry of species for ornamental and aquaculture purposes to mitigate the introduction of marine and freshwater IAS.
- Increased knowledge and awareness on IAS threats, impacts, management options and best practices for relevant industries, enterprises (aquaculture, transport, custom, tourism, etc.) media, security forces, schools etc. through a comprehensive national communication, outreach program and delivery of community training

Investment in sustainable management, prevention, eradication, and control of IAS and restoration of IAS- degraded habitat at key marine and coastal areas

- Draft management plans will be design for 4 areas (Kuntaur swamp; kayaye Islands, Jamagen, and Abuko Nature Reserve) with identification of site-specific measures for prevention, ensure eradication, control and management of IAS
- Measures to detect, control spread of IAS at the target sites in collaboration with local communities, and targeted restoration of ecosystems degraded as a result of IAS.
- Support for the recovery of native species disturbed by IAS at selected sites

Implementing measures to prevent the introduction and establishment of IAS ?

The strategy works at both the national and local levels. At the national level, to improve national institutional coordination for control of marine IAS throughout all of The Gambia by establishing an inter-institutional coordination mechanism involving all key national stakeholder institutions. Primarily this will include, as well as potentially the Ministry of Environment Climate Change and Natural Resources, Ministry of Foreign Affairs, Ministry of Agriculture and Ministry of Finance. The pilot program will also develop a national strategy on addressing marine IAS, which is integrated with the National Biodiversity Strategy and Action Plan. The national strategy on marine IAS will include gender mainstreaming considerations, as relevant. In addition, the program will improve knowledge management related to marine IAS, in order for key stakeholders to have an improved understanding of the status of marine IAS, and improve capacities to enforce regulations and other control measures related to marine IAS. At the site level, the program will develop marine IAS management plans involving all key local stakeholders (including women's groups representatives). The program also plans to provide capacity strengthening support for IAS management and control at both the national and local levels, through training, improved management procedures and mechanisms (e.g. site-based IAS

Distribution of IAS in the country changing over time

The two most invasive of the exotic plant species to be found in The Gambia are the neem tree (*Azadirachta indica*) and Lantana (*Lantana camara*). The neem tree spreads through suckering and has formed extensive thickets in many parts of the country. It's control is hampered by the ability of the roots to sprout and its spread is threatening many habitat types from coastal scrub-woodland to riverine forest in the fresh water stretches of The River Gambia. The water hyacinth (*Eichhornia crassipes*) has also become established in the upper reaches of the Allahein River and requires elimination to prevent/reduce its spread. Three species of animals have colonized The Gambia. Two of these, the brown rat (*Rattus norvegicus*) and the house mouse (*Mus musculus*), are pests of stored food and goods. The third species, the house sparrow (*Passer domesticus*) poses no foreseeable threat at the moment.

Actions are being taken to eradicate or control existing IAS,

There is an urgent need for a comprehensive research and monitoring programme to determine and implement an appropriate control technique.

Institutional Mandate: NARI-The National Agricultural Research Institute and the crop protection Unit of the Department of Agricultural Services are responsible for the control of alien invasive species that threaten agricultural crops. As regards alien invasive plants and animals the management responsibility lies with the Departments of Forestry, Wildlife and Livestock Services respectively. The national environment agency, the Department of Customs and Excise, Gambia Ports Authority and the Ministry of Trade and Industry are also involved with either the management or control of alien invasive as it relates to their areas of responsibility. In the Gambian context, the capacities to assess and monitor alien invasive and legislative measures to control them are either lacking or extremely weak. National control programmes: there is no coordinated national programme for the control of alien invasive species. However, various sectoral and piecemeal control programmes do exist which aims at distinguishing the harmful from the harmless alien species and identify the impacts of the former on native biodiversity. Four major options have been identified for dealing with alien invasive species;

- a. Prevention (interception, treatment of suspected material.)
- b. Early detection – to determine possibility of eradication or containment
- c. Eradication
- d. Control – to reduce the density and keep below an acceptable threshold.

Border control and quarantine measures

The establishment and implementation of border control and quarantine measures is the most important proactive action in the Gambia that can take to prevent or limit the introduction of quarantine pests or IAS via imported commodities and other regulated articles. Measures that prevent the introduction of an organism are normally less expensive and much more cost-effective than measures aiming to eradicate the same organism once it is introduced. International Trade and Invasive Alien Species ,The CBD's guiding principle to implement border controls and quarantine measures to minimize the risk of introducing alien species that are, or could become, invasive . These quarantine measures should be based on risk assessment, and existing appropriate stakeholders should be strengthened, as necessary, to implement the measures.

The Gambia implement border controls and quarantine measures for alien species that are or could become invasive to ensure that:

- Intentional introductions of alien species are subject to appropriate authorization
- Unintentional or unauthorized introductions of alien species are minimized.
- The Gambia will consider putting in place appropriate measures to control introductions of invasive alien species within the State according to national legislation and policies where they exist.
- These measures should be based on a risk analysis of the threats posed by alien species and their potential pathways of entry.

Prevent the introduction of new IAS or the spread of existing IAS?

Existing appropriate government institutions or authorities will strengthened and broadened as necessary, and institutions will properly trained to implement these measures, which put in place to regulate in and out of the Invasive Alien species in and out of the Gambia. The training and relevant shareholders have institutional working relation to Border control and quarantine measures to discourage invasive Alien Species into the Country.

Plant, insect and related-insect species constitute a significant representation of the alien species found in The Gambia. Of these, the prominent and the most notorious species include: invasive insects (mealy bugs, fruit flies, spiraling white flies), invasive red spider mites, invasive weeds (wild rice, African bush tea, rattlebox, sedges) and invasive birds such as the *Quelea quelea* is one of alien invasive bird species in the country.

Aquatic Weeds In The Gambia some important ecosystems such as the Manjie Kunda/Kololi and Kuntaur fulla Kunda , Niumi jamagen and Nurwoiye stream is colonized by water hyacinth. Other important water bodies may fall victim under the spread of this typical invasive aquatic weed if no extraordinary steps are taken to contain the weed.

Pathways and Spread of IAS

Some invasive alien species have entered The Gambia through diverse and unknown pathways. However, trans-boundary movement of people and their commodities is apparently the cardinal cause of the introduction of some of the species presently established in the country. In general, one or more of the following pathways have enabled the entry of the invasive species currently in The Gambia:

- Natural and or trans-boundary movement of the species;
- Farming (with introduction of new plant species) by people;
- Landscaping (with introduction of some undesirable plant species like water hyacinth as ornamental, or use of non-native genotypes) by people;
- Discarding of infested materials (rubbish, or accidentally spreading seeds and plant fragments);
- Movement of infested commodities / goods, or their containers, or conveyors;
- Movement of people (by air, road, rail and sea transport); and
- Direct intentional or unintentional introduction of crops and livestock infested with pests and diseases by Agriculture and Forestry;
- Infrastructure development, pump and tidal irrigations through canals, runoffs of rain water.

Conclusion

The program has a three-stage hierarchical approach, combined with the 15 guiding principles for the prevention, control, and mitigation of impacts from IAS that threaten ecosystems, habitats or species. The three-stage hierarchical approach relates to the prevention, control, and mitigation of IAS and their negative impacts on native ecosystems and species. The specific implementation of each of these approaches depends on the particular characteristics of each IAS and the corresponding characteristics of native species and the type of habitat targeted.

This first part of the theory of change is expected to directly reduce the rate of new IAS introductions into Gambia's marine water in the future. This will be achieved by increasing the capacity of the Government of The Gambia to implement the Water Convention and the National Water Management Strategy. Monitoring and controlling water will significantly reduce the risk of new IAS introductions. With fewer new marine IAS introductions there will be fewer negative impacts on native biodiversity, as well as fewer negative economic and social impacts along the Gambia's coast and riverine.

The second part of the theory-of-change relates to the control of IAS already present in The Gambia's marine ecosystems. The project addresses this strategy through multiple outputs, while incorporating a majority of the CBD's guiding principles. The pilot control measures at four sites in key marine ecosystems distributed among The Gambia's three major bordering seas, the Southern, Northern and Eastern parts of the country working groups), and necessary equipment. Both the

prevention and control strategies will be implemented through the program's education and awareness activities, which will increase the understanding of the marine IAS problem, and recognition of means to address marine IAS amongst local authorities, targeted user groups, and the general public. Finally, the project will also undertake some direct control measures to minimize negative impacts of marine IAS, and strengthen native biota and ecosystems. The direct control measures will be implemented through the fiscal incentive mechanisms to be piloted by the program these mechanisms will be structured to leverage local resource user efforts in order to physically remove targeted marine IAS that have significant negative impacts on native biodiversity and ecosystems. It is anticipated that these efforts will primarily target the reeds, water hyacinths), and invasive fish (*tilapia*..)