Banc d'Arguin National Park

2020 Conservation Outlook Assessment

SITE INFORMATION

Country: Mauritania
Inscribed in: 1989
Criteria: (ix) (x)

Fringing the Atlantic coast, the park comprises sand-dunes, coastal swamps, small islands and shallow coastal waters. The contrast between the harsh desert environment and the biodiversity of the marine zone has resulted in a land- and seascape of outstanding natural significance. A wide variety of migrating birds spend the winter there. Several species of sea turtle and dolphin, used by the fishermen to attract shoals of fish, can also be found. © UNESCO

SUMMARY

2020 Conservation Outlook

Finalised on 02 Dec 2020

SIGNIFICANT CONCERN

The values of PNBA have attracted major efforts by the Government of Mauritania and international partners for the protection and sustainable management of the site. These efforts have created a legal, institutional and financial basis for the management of the park, which should be used to its full potential in order to avert significant emerging pressures and threats from unsustainable fishing, climate change, oil exploration and the degradation of terrestrial ecosystems. While the overall marine and avian values remain largely intact and the protection and management framework for the Banc D'Arguin National Park is strong, its conservation outlook is of significant concern due in large part to emerging challenges originating within and outside its boundaries, principally from unsustainable fisheries, climate change and increasing industrial activities. Unsustainable fishing within and outside PNBA, plastic waste accumulation and climate change are the main current pressures. Increasing effects of climate change can already be observed, especially on intertidal ecosystems, and need to be monitored to anticipate their influence on the values of the PNBA. However, several values are already in decline, with the recent data (2018) indicating that that total number of birds within the PNBA decreased from 2.5 to 2 million since 1980.

FULL ASSESSMENT

Description of values

Values

World Heritage values

▶ Intertidal ecosystems **Criterion:(ix)**

Relatively undisturbed nutrient-rich shallow tidal coast with high ecosystem diversity and productivity: extensive seagrass beds of Zostera noltii, salt marshes, 3,100 ha of mangrove swamps, 63,000 ha of mudflats, channels and creeks. Supports extensive fish nursery areas, occurrence of marine mammals (eg hump-back dolphin) and large aggregations of migratory waterbirds (UNEP-WCMC, 2012; World Heritage Committee, 2010). The intertidal ecosystems of the site are also a main focus of a Ramsar site there (Wetlands International, 2013).

▶ Subtidal ecosystems **Criterion:(ix)**

630,000 ha marine areas within PNBA. Submarine bank/shelf extending up to 80 km from coast, with some extensive seagrass beds of Cymodocea nodosa with Halodule wrightii. Exceptionally productive marine ecosystem due to coastal upwelling. Rich invertebrate communities (UNEP-WCMC, 2012). Belongs to a WWF 200 priority marine ecoregion (WWF, 2013).

▶ Terrestrial ecosystems **Criterion:(ix)**

570,000 ha of terrestrial lands within PNBA. Landscapes consist of dunes, sand hills, sandstone cliffs, islands with their typical ecosystems and Saharan vegetation with some Mediterranean influences. The area testifies to ongoing ecological processes, primarily desert ecosystem succession (World Heritage Committee, 2010; UNEP-WCMC, 2012).

▶ Migratory and breeding waterbirds **Criterion:(x)**

More than 2 million waterbirds (30% of those using the eastern Atlantic Flyway) winter at PNBA – one of the world’s largest concentrations of wintering waterbirds. PNBA is the most important breeding area on the Atlantic seaboard, with 15 breeding species of fish-eating birds. Several species of global conservation concern and endemic subspecies make this an outstanding Important Bird Area (World Heritage Committee, 2010; BirdLife International, 2013).

▶ Fish fauna **Criterion:(x)**

Banc d’Arguin provides the biggest fish feeding, nursery and spawning area in West Africa. Three distinct fish communities with high abundance and species richness. Important spawning and nursery area for sharks and rays (World Heritage Committee, 2010; UNEP-WCMC, 2012).

▶ Marine mammals and turtles **Criterion:(x)**

Marine mammals regularly recorded include killer whale, Atlantic Humpbacked Dolphin, Common Dolphin, Rough-toothed Dolphin, Bottlenose Dolphin and Risso'sDdolphin. Fin Whale (or Common Rorqua)l and Common Porpoise have also been sighted. A small population of about 150 Monk Seal is found north of Nouadhibou, which is outside the property at the Cap Blanc reserve. Four species of turtles frequent the area: Green, Loggerhead, Hawksbill and Leatherback. The shallow tidal flats act as important breeding and nursery areas. The site is an important feeding area for adult and immature Green Turtle due to the pristine and extensive seagrass beds (World Heritage Committee, 2010; UNEP-WCMC, 2012).

▶ **Terrestrial mammals** **Criterion:(x)**

Among terrestrial mammals, there are still some remnant populations of Dorcas gazelle (Gazella dorcas) (World Heritage Committee, 2010).

Assessment information

Threats

Current Threats

High Threat

Unsustainable fishing (including fishing for sharks and rays) inside and outside PNBA, both large scale commercial and artisanal, is the main current pressure. Fishing inside the park requires improved control and the rules agreed with the fishermen implemented, which is not presently the case. A number of other threats remain of high concern, including the increasing impacts of climate change especially on coastal ecosystems and bird populations, the noticeable accumulation of solid waste from micro to macroscale and the spreading of some aquatic invasive species

▶ **Fishing / Harvesting Aquatic Resources** **High Threat**

(Fishing outside the site)

Inside site, extent of threat not known
Outside site

Strong pressure from international (including European) fleets – in 2012, 334 foreign trawlers were licensed to fish in waters surrounding PNBA (UNEP-WCMC, 2012). The presence of the international fleets was continuous and significant from 2012 to 2020 in the vicinity of the PNBA (Global Fishing Watch, 2020). In addition, artisanal fishing catch in the immediate vicinity of the property has increased by more than a factor of ten between 1994 and 2010. The fishing effects on PNBA's food webs and ecosystems are unclear as the importance of areas outside park for lifecycle stages of most fish is not known, however, significant impacts on the OUV of the property are likely according to the strong dependence of fisheries to the PNBA (UNESCO/IUCN, 2010; Meissa et al. 2018). The development of commercial fishing ports at Nouadhibou and Tanit (respectively 20 km NW and 50 km south of the PNBA), further increases pressure on the marine resources around and inside the site. The pollution of water by boats and the fishing gear wastes impact negatively the PNBA, leading for instance to sea turtles stranding events in the PNBA (Hama et al., 2019).

▶ **Water Pollution, Solid Waste** **High Threat**

(Pollution from terrestrial sources)

Inside site, scattered(5-15%)
Outside site

Senegal River brings agricultural runoff (IUCN, 2008). The Taziast gold mine at 60 km from the site uses water from important underground watersheds connected to the park, but pollution may be limited as the mine is reported to use a closed water loop. Significant water pollution with high concentrations of cadmium in the marine waters, as well as an unacceptable amount of plastic and other waste have been also confirmed more recently (UNESCO/IUCN, 2014; ARC-WH & IUCN, 2016; Trégarot et al., 2018). Macro-plastics come among others from the development of Chami, Mamghar and most likely from Nouadhibou as well. The disintegration into microplastics, when ingested by marine organisms, cause chemical and physical damage to a wide range of marine organisms, representing different trophic levels (Hollman et al. 2013, Setälä et al. 2016).

▶ **Tourism/ visitors/ recreation** **High Threat**

(Unsustainable tourism)

Inside site, localised(<5%)

The 2014 UNESCO / IUCN mission encountered two rallies during its 7-day visit to the park. It also noted that the park is riddled with off-road tracks. There is no signage to warn drivers that they are in a national park. The 2014 mission further noted tourism-related pollution from abandoned solid waste, and considered that as the new city of Chami becomes populated, there may be an increasing demand for beach tourism (UNESCO / IUCN Mission Report, 2014). The 2016 technical mission to PNBA provided updated status on the ecotourism in the Park, and developed a set of recommendations to support the

livelihood of the locals through encouraging local infrastructure and training of women in the field of ecotourism (Salim and Abdulhalim, 2016). Between 2017 and 2018, the CSBA examined two requests for the installation of tourist infrastructure inside the PNBA. One request related to the construction of an airfield and the other to the construction of a beach (Chami Beach). The CSBA issued an unfavorable opinion each time. This means that the PNBA is under strong pressure from tourism operators. Tourism is still poorly developed in the PNBA, its impact on the local environment is therefore limited (Boide et al., 2018). However the over-frequentation during the week-ends and the added pressure on fish population due to fishing excursions; the degradation of coastal dunes due to non-organized 4x4 traffic and noise pollution to the avifauna; the degradation of coastal vegetation; the over-consumption of freshwater and the management of tourism waste (inexistant in the PNBA), is an added pressure to the site that need to be controled.

▶ **Fishing / Harvesting Aquatic Resources**

(Fishing inside the site)

High Threat
Inside site, widespread(15-50%)
Outside site

Reduction in catch following overfishing by external poachers made local fishermen use unsustainable fishing methods (UNEP-WCMC, 2012). Illegal fishing within PNBA strongly reduced by 2009, owing to agreement with local Imraguen fishermen, improved patrolling capacity and effective surveillance scheme. Artisanal fishing is becoming increasingly commercial, and the increasing number of non-Imraguen fishermen in the park, as well as the increasing targeted fishing of sharks and rays, which reaches an estimated 1,000 tonnes per year, are a significant concern (State Party of Mauritania, 2019). Illegal motorised fishing is effectively repressed but local fishing pressure has increased and in 2018 was estimated at 3,600 tonnes. Fisheries also affect Mediterranean Monk Seal (outside the site), reduce habitat, and abandoned nets cause seal and turtle mortality (IUCN, 2008; Hama et al., 2019). While the Mauritanian Institute of Oceanographic Research and Fisheries (IMROP) considers the current fishing effort in the park is sustainable, increasing fishing practices and the still important catches of sharks and rays are a real concern (UNESCO / IUCN Mission Report, 2014; Trégarot et al., 2018). The overexploitation of top predators can have serious impact on the trophic web, including population of birds (Trégarot et al., 2018). The recent State of Conservation report presented by the Mauritanian Government has demonstrated a set of measures that ensure accepted level of sustainable fishing; however, the results are not obvious or available up to the time of the current assessment (State Party of Mauritania, 2019).

▶ **Habitat Shifting/ Alteration, Ocean acidification, Temperature extremes, Storms/Flooding**

(Climate change and extreme weather events (flooding, storms, erosion, etc.))

Very High Threat
Inside site, widespread(15-50%)
Outside site

Ongoing climate change already impacts the PNBA. Landscape changes triggered by climate change may affect food webs and ecosystem functioning (IPCC, 2019). Sea level rise and erosion are modifying the flat and sandy coastlines and impact marine and terrestrial ecosystems (e.g. El-Hacen et al., 2018). Up to 70m of recent coastal retreat has been observed near Iwik (Trégarot et al., 2018). Areas rarely flooded before are at present flooded frequently threatening breeding colonies of endemic sub-species. For the local subspecies of Eurasian spoonbill, the threat is very high and park management has artificially raised their nesting sites on the island of Nair to provide refuge. A decline in the reproductive success of this subspecies has been recorded, which may be related to a rising sea level (UNESCO / IUCN, 2014). Some areas, for example Neroumi island, have been flooded almost permanently. Submersion of islands and islets leads to the loss of suitable habitat areas for some species (IUCN Consultation, 2017). Climate change also impacts staging sites of migratory birds outside the PNBA (in the Arctic for instance), modifying their displacements and thus their presence in the PNBA (Rakhimberdiev et al., 2018). Worryingly and partially due to climate change, the total number of birds within the PNBA decreased from 2.5 to 2 millions since 1980 (PNBA, 2018). PNBA marine ecosystems crucially depend on climate-sensitive East Atlantic upwelling, wind and marine currents and water temperature, but the exact response of these parameters to future climate change is unknown. Coastal ecosystems play an important role of protection from marine storms and cyclones that could be limited in the future (Trégarot et al., 2018, Vousdoukas et al., 2020). In contrast, sea level rise creates new intertidal ecosystems on low-lying lands, that could be future hotspots of biodiversity (Trégarot et al.,

2018). A breach made by the ocean in the dune cord has been observed at Bellaât (Cap Sainte-Anne) since 2013. This breach has given birth to an important permanent lagoon which hosts a great biodiversity (Report of the Scientific Council of Banc d 'Arguin 2017)

▶ Invasive Non-Native/ Alien Species

High Threat
Inside site, localised(<5%)
Outside site

(Invasive species in marine ecosystems)

Three marine invasive non-native species were identified during a scientific survey by boat around Ejewir in May 2018 (CSBA, 2018). The green alga Caulerpa taxifolia was collected by fish nets and fishermen reported its extending presence around Tidra island. This very competitive alga could constitute a serious threat for the local seagrass. An invasive ascidian tunicate (Botrylloides diegensis) and an unidentified red alga were also observed.

▶ Water Pollution, Solid Waste

High Threat
Inside site, localised(<5%)

(Plastic Pollution)

Between the villages of Teichott and R'Gueiba, directly on the coast, there is what looks like a deposit of plastics from various sources. This open dump seems to be fed by ocean currents from the open sea. It extends over several kilometers (Mission CSBA 2018).

Potential Threats

High Threat

Intensifying climate change will very likely have major and unprecedented - at least considering modern times - consequences on PNBA ecosystems. Whereas their magnitudes will depend on greenhouse gas emissions over the 21st century; sea level rise, ocean and air temperature increase will be in any case noticeable in future, affecting marine and terrestrial ecosystems. Among other processes, climate change could also modify the ocean currents, the marine biomass or the occurrence of extreme weather events. Accidental oil spills from oil platforms or tankers near PNBA are an increasing potential threat. The same is true for planned extensions of mining/quarrying operations and exploration. Ongoing and planned development projects which are contributing to the site becoming less isolated and more easily accessible, are likely to increase human pressures on the site, and the coming years will be decisive to ensure that its OUV will not be compromised.

▶ Oil/ Gas exploration/development

Very High Threat
Inside site, extent of threat not known
Outside site

(Pollution from oil exploration/exploitation and shipping)

Oil exploration is banned within PNBA. Oil/gas exploration and exploitation to the west and south-west of PNBA is ongoing, without appropriate safeguards in place. Increased tanker traffic is an additional threat. Insufficient oil spill risk management capacity in place (IUCN, 2009, 2013). No oil exploration concessions overlap with the property and a buffer zone of 5 km around it; however, a number of exploration areas are located in its surroundings (State Party of Mauritania, 2019). Recent explorations were carried out in 2017 and 2019 in area important for biodiversity (breeding zones, cold-water corals, etc.) with potential impacts on marine mammals, due to noise pollution (Williams et al., 2015). Increasing offshore oil exploration and exploitation increases the risks of an oil spill which, even occurred, would have catastrophic impacts on the property and on the fisheries in the region (UNESCO/IUCN, 2014).

▶ Mining/ Quarrying

High Threat
Inside site, extent of threat not known
Outside site

(Mining)

Plans (currently subject to EIA) to further develop mining exploration/exploitation and quarrying near the property at Taziast gold mine and Tanoudert area, as well as expansion of iron ore production at Cap Blanc, with potentially serious impacts related to pollution, water use and habitat destruction (IUCN, 2013). There are concerns that the planned expansion of the Taziast mine may cause more significant pollution, as it may contaminate groundwater with seawater pumped from a location 5 km north of the park, from the Baie du Levrier. This water will be treated at its source with biocides, which are likely to

be discharged into the bay, with potential negative impacts on its marine life (UNESCO / IUCN Mission Report, 2014).
This water pumping could also negatively impact the water occurrence in the – already extremely dry – PNBA terrestrial ecosystems. The uncontrolled development of gold production at Chami could negatively affect the PNBA ecosystems and food webs. Indeed, mercury and cyanide are used without control and contaminated muds, that could disseminate within the PNBA with the wind, are not treated.

▶ **Housing/ Urban Areas** — **High Threat**

(Infrastructure development)

Inside site, extent of threat not known
Outside site

There is an increasing number of development projects within the park and its wider area, all of which will have to be subject to Environmental Impact Assessment prior to their implementation, including an assessment of their cumulative impacts. The planned construction of a high-voltage electricity line along the Nouakchott-Nouadhibou road could have negative impacts on the park's bird populations (resident and migratory) (UNESCO / IUCN, 2014). The recent development of Chami, and the extension of Mamghar put further pressure on the Park, with further traffic, and more wastes. No recent information is available as of 2020.

▶ **Marine/ Freshwater Aquaculture** — **Data Deficient**

(Aquaculture development)

Inside site, extent of threat not known

Aquaculture development was identified as a potential threat for Cap Blanc area and the Mediterranean Monk Seal in 2008 (IUCN, 2008), but impact not assessed yet. No recent information is available as of 2020.

▶ **Storms/Flooding** — **High Threat**

(Climate change)

Inside site, extent of threat not known
Outside site

Increasing effects of climate change are anticipated over the 21st century, as the submersion of at least 5% of the PNBA area and locally more than 100m of sandy coast retreat due to sea level rise (ClimateCentral, 2020; Vousdoukas et al., 2020), loss of seagrass beds and other vegetated habitats due to extreme climatic events, high seawater temperatures and stress of desiccation at low tide caused by strong evaporation during a drought (IPCC, 2019). Consequently, climate change could have a negative impact on the primary production, animal biomass and fisheries catch in marine ecosystems (IPCC, 2019).

▶ **Water Pollution, Industrial/ Military Effluents, Air Pollution** — **Very High Threat**

(Gold panning)

Outside site

The installation, since 2016, of a gold ore processing center in Chami constitutes a real threat to the PNBA coastline. This center treats the poriferous mineral with mercury. The treatment is done under the open sky. The treatment sludge is stored on site. After drying, they are transported by wind to the coast which is less than 75 km away. There is a real risk of contamination of the food chain of the PNBA reserve (Gagnol L. 2020).

Overall assessment of threats — High Threat

Unsustainable fishing (including fishing for sharks and rays) within and outside PNBA and climate change are the main current pressure. Fishing effort and captures inside the park have steeply increased, but seem stable and are relatively well-controlled. The increasing commercialization of artisanal fishing is a real concern. Climate change and especially the related sea level rise already has already modified the coastline and led to flooding of new areas. With increasing air and water temperature, the occurrence of extreme weather events, ocean currents (etc.), climate change will have significant consequences on marine and terrestrial ecosystems of the PNBA. Increasing accumulation of solid waste is also observed in the PNBA, especially in the coastal area. Accidental oil spills from oil platforms or tankers near PNBA are an increasing potential threat. Mining activities are

likely to expand in the near future and may cause negative impacts on fresh water resources. Pressures on terrestrial ecosystems may increase in the short term due to new urban developments under construction outside of the park's eastern boundary in Chami and in Mamghar, inside of the park. All of these developments will require a thorough assessment of their impacts on the park, including their cumulative impacts.

Protection and management

Assessing Protection and Management

▶ **Management system** — **Mostly Effective**

First preliminary management plan in 1984 (UNEP-WCMC, 2012). Master Plan for the Development of PNBA 1994 – 2003 adopted in 1995, but was never operational. Management Plans 2004 – 2009 and 2010-2014 developed with German Technical Cooperation (GTZ)/FIBA assistance, Management Plan 2010-14 (PNBA, 2009b) approved. Management plans have included business plans. Institutional setup of PNBA prescribed by Decree No. 2006-058 (2006). Sustainable pasture management plan under development 2009 (IUCN, 2009). Two important agreements have recently been signed by the Government (AEWA and an MoU with the Wadden Sea) (Repub. Isl. Mauritania, 2015). A Management Plan has been developed for the 2020-2024 period.

▶ **Effectiveness of management system** — **Some Concern**

Management effectiveness improved until 2008 (IUCN, 2008). Challenge to adapt management to emerging pressures and threats. Institutional modernization 2005-09. Room for improvement of management (e.g. human resources) noted in 2010. A management effectiveness evaluation carried out with IUCN in 2013 revealed that the effectiveness of management is between "good" and "medium" depending on the management aspect evaluated, but that the management plan is suffering from a low level of implementation (UNESCO / IUCN Mission Report, 2014). One of the pressing issues regarding the day-to-day management was the location of the field management being located remotely; however, it seems that it was relocated closer to the property where the necessary infrastructures were prepared (Salim and Abdulhaleem, 2016). A decree in 2015 transferred the PNBA's headquarter from Nouakchott to Chami, in the direct vicinity of the property (State Party of Mauritania, 2019). It increases the effectiveness of the management system and especially the relation with all the stakeholders. Since 2016, a Management Plan Dashboard has been created to assess its effectiveness (Stat Party of Mauritania, 2019). In 2018, 20 indicators on natural values, socio-economical dynamics and governance have been assessed for the first time, showing both improvement and worsening among these specific indicators. This dashboard still needs to be further developed, but it constitutes a relevant and useful tool to assess and improve the effectiveness of the management system.

▶ **Boundaries** — **Some Concern**

Recent offshore oil exploration and deep water pumping respectively few kilometres at the West and East of the site raise concerns about potential impacts on its integrity (State Party of Mauritania, 2019).

▶ **Integration into regional and national planning systems** — **Some Concern**

PNBA is well supported by national legislation (Sidi Sheikh & Al Dhafer, 2010), and reportedly also by national plans on artisanal fishing development (IUCN, 2013). However, there is concern about the due consideration of the parks interests in infrastructure and other development projects, including mining (IUCN, 2013). A number of developments have been completed inside and in the close vicinity of the site without having been subject to an EIA. The increasing development of gold and oil extractions in the region and the related building of infrastructures should be better planned and regulated, in order to limit the threats to the OUV.

▶ Relationships with local people

Some Concern

Generally good relations with Imraguen communities which have exclusive fisheries access since 2000 (IUCN, 2008). Local participation through annual workshops and fisheries committees. However, fishermen are economically dependent on local merchants (UNEP-WCMC, 2012). Fisheries related decision making by PNBA questioned by Imraguen in 2010 (Sidi Sheikh & Al Dhafer, 2010).
The 2014 UNESCO / IUCN mission to the site noted a feeling of distrust between local people and park administration, and not a single consultation meeting, which is essential to participatory management, had taken place in 2013. Tabe'a Report II (2015) has indicated to the positive level of the relationships among the partners (including the locals), and a stakeholders meeting was held in March 2016 which gathered different stakeholders and locals and provided a good forum to discuss the issues and the difficulties facing each of the stakeholders. Several meetings with local people were organised by the park managers (State Party of Mauritania, 2019). An important issue remains the shark and ray catches by Imraguen. The State Party committed to ban this activity as of 2020 and this might lead to conflicts with local people.

▶ Legal framework

Mostly Effective

Important progress has been made with the establishment of a legal framework for the site since its inscription. A special law on PNBA (2000) and two government decrees (2006) are very important for sustainable development and the conservation of the site (UNESCO / IUCN Mission Report, 2014). PNBA administration set up as semi-independent entity under Ministry of Environment. 95 staff including 42 on-site in 2010 (Sidi Sheikh & Al Dhafer, 2010). Guarded entry points and patrolling guards in place. Strengthening of marine surveillance capacity and fleet and establishment of camel patrol until 2009 (IUCN, 2009). Capacity of field presence of PNBA is not sufficient to achieve full enforcement on the ground, and field enforcement is still challenged by logistic constraints (lack of food, water, communications) (Sidi Sheikh & Al Dhafer, 2010). The headquarters of the park administration moved to the new city of Chami, which should facilitate an increase in field presence (UNESCO / IUCN Mission Report, 2014). According to the recent SOC report by the Mauritanian Government, a set of legal measurements and revisions were made to reinforce the legal framework, including, expansion of the National Committee, revision of the local management structure and expansion of the list of local stakeholders, signing of two important agreements (AEWA and MoU with the Wadden Sea) (Repub. Isl. Mauritania, 2015).

▶ Law enforcement

Data Deficient

Data deficient

▶ Implementation of Committee decisions and recommendations

Some Concern

Most but not all recommendations were followed by the State Party in the past: Request to adopt two decrees to implement Special Law for PNBA at 30.COM (2006) fulfilled by 31.COM (IUCN, 2007); Requests for provision of EIA reports and mitigation measures and precautions for road construction and oil exploration from 27.COM (2003) not followed by SP until 33.COM (IUCN, 2009); PSSA status designation recommended since 28.COM (2004) not yet fulfilled, but preparations are underway (UNESCO / IUCN Mission Report, 2014); Request to apply Law 2000/25 at 29.COM not followed by 32.COM (IUCN, 2008); Invitation to establish Biosphere Reserve at 29.COM not followed until 37.COM. Request to implement MEC and MARPOL at 30.COM not implemented by 32.COM (IUCN, 2008). Request to establish Oil Spill Emergency Response Plan at 31.COM apparently not followed until 2011 (Conf. pers. comm., 2011). Request to report on the monitoring of the state of values of PNBA at 31.COM not fully met by 34.COM (but see PNBA, 2009a). Recommendation to finalize PNBA zoning at 32.COM not implemented until 2011 (Conf. pers. comm.., 2011). The recent State of Conservation report that was prepared by the Mauritanian Authority indicated that the Mauritanian Government had directed all of the responsible authorities to work on the WH Committee decisions and the 18 of the reactive monitoring mission to PNBA. (Repub. Isl. Mauritania, 2015). The State Party has addressed most of the requests expressed by the Committee at its 42nd Session (State Party of Mauritania, 2019); however, no

progress has been achieved yet with the inscription of the site as a Particularly Sensitive Sea Area.

▶ Sustainable use — Some Concern

The traditional use agreements with Imraguen fishermen are an example of a generally successful reconciliation of traditional use interests inside the property and conservation objectives (UNEP-WCMC, 2012). However, it should be noted that the rules agreed concerning fishing inside the park are not adequately implemented. While the Mauritanian Institute of Oceanographic Research and Fisheries (IMROP) considers the current fishing effort in the park is sustainable, artisanal fishing is becoming increasingly commercial, and many Imraguen employ non-Imraguen Mauritanians on their fishing vessels. The use of mono-filament is also reported, and targeted fishing of sharks and rays is increasing (UNESCO / IUCN Mission Report 2014). There are concerns about the sustainability of fisheries outside the property and of terrestrial resource use and a strategy to address these was under preparation in 2009 (IUCN, 2009).

▶ Sustainable finance — Mostly Effective

2010 annual budget of PNBA ca. € 1.2 million (Conf. pers. comm., 2011), half of which is sourced from fisheries agreements with EU (Sidi Sheikh & Al Dhafer, 2010). Trust fund (BaCoMaB) has been created in 2009, and currently 10.7 million euros have already been mobilized. The target is to capitalize 55 million euros by 2020 (UNESCO / IUCN Mission Report, 2014). $2.29 million raised by FIBA in support of PNBA by 2001. Reportedly more financial investment in human capital needed; room for improvement on donor coordination (Sidi Sheikh & Al Dhafer, 2010). If at the time of inscription the site depended mostly on funding from external sources, it currently receives a significant budget allocation from the government, while financial and technical support from partners remains important (UNESCO / IUCN Mission Report, 2014).
Due to the changes in financial policies, it seems that PNBA has no clear long-term plans to ensure financial sustainability (ARC-WC & IUCN, 2015). The 2019 State Party Report does not contain the budget of the National Park. Financial support from the European Union, German, French, Spanish and Japanese cooperation, and other donors, such as MAVA Foundation are mentioned (State Party of Mauritania, 2019).

▶ Staff capacity, training, and development — Some Concern

Many training courses for PNBA staff have reportedly been conducted but an overall vision and strategy has been missing, and the proficiency of staff to perform their tasks has reportedly not risen in spite of training efforts. This has been true particularly for field staff (Sidi Sheikh & Al Dhafer, 2010)

▶ Education and interpretation programs — Serious Concern

An ecological education programme is part of the 2010-2014 management plan of the property (PNBA, 2009b) and some information and educational materials are available from the PNBA and FIBA websites. There is only limited information about the effectiveness of existing programmes. Recently constructed Youth Centres (2006) appear not to be used by most villagers and are in an advanced state of disrepair. Interpretation panels with glass covers have been placed in the park but have filled up with sand and are now illegible (UNESCO / IUCN Mission Report, 2014).

▶ Tourism and visitation management — Some Concern

Ecotourism Development Strategy since 2006 (IUCN, 2007), and part of 2010-2014 management plan (PNBA, 2009b). Reportedly national ecotourism strategy prepared for 2010-14 to encourage sustainable tourism in PNBA. Village Camps were constructed in 2008 to promote ecotourism, but are now falling in disrepair due to a lack of maintenance (UNESCO / IUCN Mission Report, 2014). Also due to security issues in the region, the number of visitors remains very limited (< 4000) whereas ecotourism is often considered as having a large potential and also as being an alternative to create incomes for local people and limit fisheries pressure (Trégarot et al., 2018, State Party of Mauritania, 2019). A report on Ecotourism and its perspectives of development has been proposed in 2018 (State Party of Mauritania, 2019).

▶ Monitoring

Some Concern

Fisheries monitoring methodology developed with Mauritanian Institute of Oceanographic Research and Fisheries (IMROP). Plans to develop remote sensing approach to monitoring of the site with French Remote Sensing Centre. Still insufficient information to evaluate status of fish stocks within PNBA (PNBA, 2009a). Establishment of global monitoring system (bio-physical, socioeconomic and governance) planned for 2011 (Conf. pers. comm., 2011). The creation in 2016 and the first assessment in 2018 of a Dashboard on the effectiveness of the Management Plan recently improved the monitoring process in the PNBA (State Party of Mauritania, 2019). This Dashboard needs to be improved and supported by more data in future.

▶ Research

Mostly Effective

Scientific observatory established at PNBA in 2007. Research on fish stocks and fisheries' impact. Information on fauna diversity of PNBA still characterized as limited in 2009 (PNBA, 2009a). Limited management relevance of research by observatory noted in 2010 (Sidi Sheikh & Al Dhafer, 2010). The Scientific Council of the Banc d'Arguin has been created and met once a year since 2014. This Scientific Council appears to be very active and independent. In addition to discussions during annual meetings and field missions, several scientific reports were produced recently and especially analysis of the EIA and the related documents produced on oil exploration and gold exploitation (Repub. Isl. Mauritania, 2019). In situ data on bird populations, fish stocks or climate change (etc.) are still lacking in 2020.

Overall assessment of protection and management

Some Concern

The legislative, institutional and financial framework for the protection and management of PNBA is strong, but the wider protection of the surrounding seas needs to be developed further in order to meet emerging challenges to the site, principally from unsustainable fisheries and exploration and increasing shipping of hydrocarbons. The management effectiveness and capacity of the park to raise sustainable funding are also in need of further improvement. The management authority of the PNBA needs to address some issues as the increasing solid waste accumulation in the site. The banning of sharks and rays fishing in 2020 will constitute an important issue to manage with regards to the relationships with local people. The recent relocation of the PNBA headquarter to Chami will allow to develop these relationships, the support to local communities and field work activities.

▶ Assessment of the effectiveness of protection and management in addressing threats outside the site

Serious Concern

The recent development of fisheries, gold and groundwater exploitations, oil exploration and other infrastructure in the close vicinity of the site raise serious concerns about potential impacts on its integrity. Indeed, whereas the national park itself remains overall well protected and managed, it becomes an increasingly isolated natural area in a developing region. These recent socio-economic developments are partly uncontrolled and do not always take into consideration the World Heritage status of the site. In a changing climate, these developments should be planned and carefully controlled at the regional scale. In order to preserve the site's values in the future, the management authority of the PNBA should be considered and consulted on these socio-economical developments.

▶ Best practice examples

The PNBA Trust Fund is another useful example of an approach to sustainable financing of natural World Heritage Properties. The maritime surveillance scheme is the most effective in the region. The Scientific Council of the Banc d'Arguin has an increasing activity and provides useful inputs for the site management.

State and trend of values

Assessing the current state and trend of values

World Heritage values

▶ Intertidal ecosystems

Low Concern
Trend:Data Deficient

Intertidal ecosystems are threatened by potential accidental oil spills from hydrocarbon extraction/transport (PNBA, 2009a), illegal overfishing and the increasing presence of solid waste. Changes in the air and water temperatures or ocean currents could also strongly affect these ecosystems (IPCC, 2019). Sea level rise and erosion are modifying the flat and sandy coastlines and up to 70m of recent coastal retreat has been observed near Iwik (Trégarot et al., 2018, El-Hacen et al., 2018). Areas rarely flooded before are at present flooded frequently threatening breeding bird colonies. A general decline was especially observed in bird species that depend on the intertidal mudflats. However, sea level rise also creates new intertidal ecosystems on low-lying lands, that could be future hotspots of biodiversity (Trégarot et al., 2018).

▶ Subtidal ecosystems

Low Concern
Trend:Data Deficient

Subtidal ecosystems were previously considered generally intact, but threatened by potential accidental oil spills (UNEP-WCMC, 2012)), as well as overfishing and the increasing presence of solid waste. PNBA marine ecosystems crucially depend on climate sensitive East Atlantic upwelling, wind and marine currents and water temperature, but the exact response of these parameters to ongoing climate change is unknown. Increasing effects of climate change are anticipated over the 21st century, as the local loss of primary production, animal biomass and fisheries catch potential (IPCC, 2019). Subtidal ecosystems remain poorly known in PNBA, and while Cymodocea nodosa have been mapped in 2018 (Pottier et al. 2018), previous monitoring are lacking to assess any changes in the ecological condition and surface area.

▶ Terrestrial ecosystems

Low Concern
Trend:Deteriorating

Already relatively degraded and deteriorating, due to land degradation/desertification, fuel wood collection, overgrazing, possibly climate change impacts since 2000 (IUCN, 2009). Solid waste has been accumulating in the terrestrial areas of the site and needs to be removed.

▶ Migratory and breeding waterbirds

High Concern
Trend:Deteriorating

Bird populations have been generally decreasing since 1980, especially due to the effect of climate change and other pressures in the PNBA and along the East Atlantic Flyway (PNBA, 2018, Rakhimberdiev et al., 2018). The total number of birds within the PNBA decreased from 2.5 to 2 million since 1980 (PNBA, 2018). Abundance of some fish-eating bird species declined as a result of decline in fish stocks (BirdLife International, 2013). The local Spoonbill is vulnerable due to flooding of nest sites as a result of climate change, and is reported to have shown a decline in reproductive success (UNESCO / IUCN Mission Report, 2014). A recent analysis suggests a decline in species that depend on the intertidal ecosystems and an increase in species depending on fish and crustaceans in the subtidal ecosystems (Oudman et al. 2020).

▶ Fish fauna

High Concern
Trend:Deteriorating

No monitoring data on trends in fish populations inside the property are available. Signs of overfishing outside the property along the Mauritanian coast (Gascuel et al., 2007) and probably also inside PNBA for some species. Fishing effort within PNBA increased threefold in recent years. While the Mauritanian

Institute of Oceanographic Research and Fisheries (IMROP) considers the current fishing effort in the park is sustainable, changing fishing practices and catches of sharks and rays are a real concern (UNESCO / IUCN Mission Report, 2014). The catches of sharks and rays has recently be limited below 1000 tonnes and will be banned as of 2020 (Repub. Isl. Mauritania, 2019). On the other hand, Seret and Naylor have recently described new Genus and species of fish fauna within the marine shallow waters of PNBA, and this discovery is considered as good indicator of the richness of the fauna diversity (specifically marine fauna), and the possibility of discovering more species in the region (Seret. B, Naylor, G.J., 2016).

▶ Marine mammals and turtles

High Concern
Trend:Stable

The 2014 UNESCO / IUCN reactive monitoring mission to the property observed a large number of turtle shells on the beach, and there was no sign of any nesting activity. Almost 1000 cases of dead sea turtles strangled by solid waste were observed recently in the PNBA (Hama et al., 2019).
The property remains an important sanctuary for dolphins, thanks to the strict implementation of the ban on motorised boats within the property.
The breeding colony of Monk Seals is now established in Guerguerat area, North of Nouadhibou, and outside the World Heritage Site at Cap Blanc. The Monk Seal is probably decreasing due to external factors outside the site, including habitat disturbance and food competition from shore-based fisheries (IUCN, 2008). Recently, the population of the Monk Seal has been estimated at 330 individuals and was assessed to be in good condition (State Party of Mauritania, 2019).

▶ Terrestrial mammals

Low Concern
Trend:Data Deficient

There is no information on the status of terrestrial mammals, but this is probably not deteriorating due to good rainy seasons in recent years which has resulted in a positive shifting in terrestrial habitats. Striped hyena is still present, as are fennec fox and jackal, the latter of which has an increasing population (UNESCO / IUCN Mission Report, 2014). The population of Dorcas Gazelle is now restricted to Tidra island as a combined result of hunting pressure and drought (UNESCO / IUCN Mission Report, 2014). There is a concern that the population of the Dorcas Gazelle has suffered genetic impoverishment due to its geographic isolation and its reduction to about 80 individuals, although this figure has recently remained stable (IUCN Consultation, 2017).

The 2014 UNESCO / IUCN reactive monitoring mission observed that there is extensive grazing of dromedaries and goats in the property, but that this is currently not a problem due to all indigenous herbivores, with the exception of the Dorcas Gazelle, already having been locally extinct.

Summary of the Values

▶ Assessment of the current state and trend of World Heritage values

High Concern
Trend: Deteriorating

The values of PNBA were nearly undisturbed until the late 20th Century, but are increasingly under pressure and some values have begun to deteriorate. While there is a good follow up of fish landing in the park, fish stocks are not evaluated and the importance of the park as a nursery zone is not well documented. Knowledge on this subject should be updated with new surveys at least in regard to species of commercial value, and assess the effective contribution of PNBA nursery to adult stock. The status of terrestrial ecosystems and their fauna remains of low concern but signs of degradation appears despite management efforts. The property continues to host significant numbers of wintering birds but the population seems to be decreasing. Increasing effects of climate change are observed, especially on intertidal ecosystems, and need to be monitored to anticipate their influence on the values of the PNBA.

Additional information

Benefits

Understanding Benefits

▶ Direct employment

PNBA directly provides almost 100 jobs, but many more additional jobs (e.g. in fisheries, tourism, and international nature conservation) depend on it.

▶ Fishing areas and conservation of fish stocks

PNBA protects not only local artisanal fisheries, but is also a key spawning and nursery area for a wide range of fish, which supplies recruitment to stocks in the wider upwelling area. These are a crucial global fisheries resource, including and particularly for EU countries. The PNBA contribution to fisheries has recently been evaluated as ~70 millions €/yr (Trégarot et al., 2018)

Factors negatively affecting provision of this benefit :

- Overexploitation : Impact level - High, Trend - Increasing

▶ Outdoor recreation and tourism

The property has a considerable, as yet strongly underused potential for nature based tourism, such as birding tours. There is also accepted level of infrastructure to receive the tourists from inside and outside the country after rehabilitating the sustainable tourism industry in PNBA (Salim and Abdulhalim, 2016).

▶ Importance for research

The National Park comprises a wide range of phenomena, which in turn support global knowledge generation on bird migration, ichthyology, coastal ecology and oceanography. It also supports long-lasting traditional knowledge system, such as those of the Imraguen. Seret and Naylor have recently described new Genus and species of fish fauna within the marine shallow waters of PNBA, and this discovery is considered as good indicator of the richness of the fauna diversity (specifically marine fauna), and the possibility of discovering more species in the region (Seret. B, Naylor, G.J., 2016). Additionally, the Environmental Educational Center in Chami will play a key role in shading more light on the values of PNBA and raising long-term awareness.

▶ Carbon sequestration

Carbon sequestration by intertidal vegetation is important. The areas occupied by this type of habitat extend some 450 km2 (IUCN Consultation, 2017). The PNBA contribution to carbon sequestration has recently been evaluated as ~80 millions €/yr and corresponds to 22% of the annual sequestration goal proposed by Mauritania during the Paris Agreement in 2015 (Trégarot et al., 2018).

Factors negatively affecting provision of this benefit :

- Climate change : Impact level - Moderate
- Pollution : Impact level - High

▶ Coastal protection

Seagrass beds, mudflats, salt marshes and mangroves of PNBA attenuate wave's energy and height and therefore contribute to the protection of the coast and villages particularly in the face of climate change (sea-level rise, extreme climatic events) (Trégarot et al. 2018). They also protect low-elevated islands, Nair and Zira, which supports breeding colonies of birds, including the endemic Mauritanian Spoonbill, Platalea leucorodia balsaci. The coastal protection provided by marine coastal ecosystems include the stabilisation of soil and flood prevention.

▶ Other

Beyond ecosystems, birds also provide a wide range of services to people. They contribute to the recycling of nutrients, carcass removal, biological control of harmful species, seed dispersal, sentinel to environmental changes, and cultural services such as bird-watching and a object of study for research and education. Nutrients input and carcasses removal were valued at 1.8 to 133.7 million €/year and 2,900 to 4,800 € respectively (Cornet et al. 2018, 2020).

Summary of benefits

The conservation and socio-economic benefits of the property reach far beyond its boundaries, as illustrated by its crucial role in carbon sequestration, its pivotal role in bird migration and as a spawning and nursery area for commercially exploited fish. There are also significant potential benefits, which could be developed further, such as those related to tourism and the ones related to the cultural and heritage value of the PNBA (but see Trégarot et al. 2018 for a broader vision of the benefits rendered by PNBA)

Projects

Compilation of active conservation projects

№	Organization	Project duration	Brief description of Active Projects
1	Fondation Internationale du Banc d’Arguin		Wide range of research and conservation projects focused on PNBA.
2	GIZ		Management of Natural Resources 2011-2013 (national level, including fisheries sector)
3	WWF WAMER		Inclusion of Mauritania and PNBA in a number of regional projects on fisheries and related issues

REFERENCES

№	References
1	African Natural Heritage. Banc d'Arguin – Mauritania - African Natural Heritage. Maps and Satellite Images of Banc d'Arguin National Park (World Heritage Site). (http://www.africannaturalheritage.org/banc-darguin-mauritan...).
2	BirdLife International (2013). 'Datazone-IBA search: Mauritania. Banc d'Arguin National Park. [Electronic reference] . Accessed 3 June 2013.
3	Boide C.C., Cornet C., Trégarot E., Failler P. (2018). Evaluation de la valeur économique du tourisme au PNBA. In Trégarot et al. (2018). Evaluation des services écosystémiques du Banc d'Arguin, Mauritanie. pp. 213-224.
4	Climate Central (2020). [online] Available at: https://choices.climatecentral.org/#9/20.2905/-16.1238?comp... [Accessed 2 March 2020].
5	Common Wadden Sea Secretariat (2014). 'Visit from World Heritage Site Banc d'Arguin, Mauritania'.
6	Conseil Scientifique du Banc d'Arguin (CSBA, 2018). 'Procès-verbal de la session du Conseil du 5 au 7 mai 2018 : Annexe IV Rapport d'Ester Serrao'. dans RÉPUBLIQUE ISLAMIQUE DE MAURITANIE ed. (2019). Rapport de l'État de Conservation du Parc National du Banc d'Arguin (PNBA) et la mise en œuvre des recommandations du Comité du Patrimoine de L'UNESCO. Novembre 2019.
7	Cornet C., Trégarot E., Failler P. (2018). Les oiseaux du Parc National du Banc d'Arguin: Services écosystémiques et potentiel économique. In Trégarot et al. (2018). Evaluation des services écosystémiques du Banc d'Arguin, Mauritanie. pp. 275-292. Cornet C., Trégarot E., Failler P. (2020). Birds of the National Park of Banc d'Arguin, Mauritania: a panel on ecosystem services. (submitted) Condor.
8	Dahdouh-Guebas, F. and Koedam, N. (2001). 'Are the northernmost mangroves of West Africa viable? a case study in Banc d'Arguin National Park, Mauritania'. Hydrobiologia 458: 241-253.
9	El-Hacen, E. H. M., Bouma, T. J., Fivash, G. S., Sall, A. A., Piersma, T., Olff, H., & Govers, L. L. (2018). Evidence for 'critical slowing down' in seagrass: a stress gradient experiment at the southern limit of its range. Nature, Scientific reports, 8(1), 1-11.
10	GIZ (2009). 'Evaluation de la stratégie et de la performance du Parc National du Banc d'Arguin - Mission d'appui à la préparation du PAG 2010-2014'. Nouakchott: GTZ Mauritania. 79 pp. (In French)
11	Gascuel, D., Labrosse, P., Meissa, B., Sidl, M. O. T. and Guenette, S. (2007). 'Decline of demersal resources in North-West Africa: an analysis of Mauritanian trawl-survey data over the past 25 years'. African Journal of Marine Science 29: 331-345.
12	Global Fishing Watch (2020). https://globalfishingwatch.org/map/. Accessed 2 March 2020.
13	Hama, F. L., Karaica, D., Dyc, C., Bilal, A. S. O., Wagne, M. M., Bâ, O. Y., ... & Fretey, J. (2019). Sea turtle stranding events along the Mauritanian coast. SALAMANDRA, 55(3), 199-210.
14	Hollman, P. C., Bouwmeester, H., Peters, R.J.B. (2013). Microplastics in aquatic food chain: sources, measurement, occurrence and potential health risks. RIKILT Re- port 2013.003. RIKILT Wageningen UR (University & Research Centre), Wageningen.
15	IPCC (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.). IPCC, Geneva, Switzerland, 151 pp.

№	References
16	IPCC (2019). IPCC Special Report on the Ocean and Cryosphere in a Changing Climate, H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.). In press.
17	IUCN (2004). 'State of Conservation Report: Banc d'Arguin National Park (N 506)'. [Electronic reference] . Accessed 5 June 2013.
18	IUCN (2005). 'State of Conservation Report: Banc d'Arguin National Park (N 506)'. [Electronic reference] . Accessed 5 June 2013.
19	IUCN (2006). 'State of Conservation Report: Banc d'Arguin National Park (N 506)'. [Electronic reference] . Accessed 5 June 2013.
20	IUCN (2007). 'State of Conservation Report: Banc d'Arguin National Park (N 506)'. [Electronic reference] . Accessed 5 June 2013.
21	IUCN (2008). 'State of Conservation Report: Banc d'Arguin National Park (N 506)'. [Electronic reference] . Accessed 5 June 2013.
22	IUCN (2009). 'State of Conservation Report: Banc d'Arguin National Park (N 506)'. [Electronic reference] . Accessed 5 June 2013.
23	IUCN (2012). 'In trouble and in need: West Africa's World Heritage'. (24 June 2012). . Accessed 26 May 2015.
24	IUCN (2012). 'The IUCN Red List of Threatened Species'. [Electronic reference] . Accessed 10 May 2013.
25	IUCN (2013). 'State of Conservation Report: Banc d'Arguin National Park (Mauritania) (N506)'. (17 May 2013). . Accessed 26 May 2015.
26	IUCN (2013). 'State of Conservation Report: Banc d'Arguin National Park (N 506)'. [Electronic reference] . Accessed 5 June 2013.
27	IUCN (2014). 'Conservation Outlook: Banc d'Arguin National Park'. (25 May 2014). . Accessed 26 May 2015.
28	IUCN (2014). 'State of Conservation Report: Banc d'Arguin National Park (Mauritania) (N 506)'. (16 May 2014). . Accessed 26 May 2015.
29	Knapp, S., Heij, C., Henderson, R. and Kleverlaan, E. (2013). 'Ship incident risk in the areas of Tubbataha and Banc d'Arguin: A case for designation as Particular Sensitive Sea Area'. EI Report 2013-16. Rotterdam, The Netherlands: Econometric Institute, Erasmus University Rotterdam. . Accessed 26 May 2015.
30	Laurent Gagnol, Géraud Magrin et Raphaëlle Chevrillon-Guibert, « Chami, ville nouvelle et ville de l'or.
31	Meissa B., Gascuel D. (2018). Contribution du PNBA aux pêcheries du plateau continental Mauritanien. In Trégarot et al. (2018). Evaluation des services écosystémiques du Banc d'Arguin, Mauritanie. pp. 139-149.
32	Osipova, E., Shi, Y., Kormos, C., Shadie, P., Zwahlen. C., Badman, T. (2014). IUCN World Heritage Outlook 2014: A conservation assessment of all natural World Heritage sites. Gland, Switzerland: IUCN. 64pp.
33	Parc National du Banc d'Arguin (2009a). 'Etat de Conservation'. Nouakchott: Ministere Delegue Aupres Du Premier Ministre Charge De L'Environnement Et Developpement Durable. (In French)
34	Parc National du Banc d'Arguin (2009b). 'Plan d'Aménagement et de Gestion 2010-2014'. Nouakchott: Ministere Delegue Aupres Du Premier Ministre Charge De L'Environnement Et Developpement Durable. 115 pp. (In French)

№	References
35	Parc National du Banc d'Arguin (PNBA, 2018). 'Rapport de l'atelier scientifique international d'Iwik-PNBA : Communications 2 et 3 de Theunis Piersma et Jan Van Gils (NIOZ)' dans RÉPUBLIQUE ISLAMIQUE DE MAURITANIE ed. (2019). Rapport de l'État de Conservation du Parc National du Banc d'Arguin (PNBA) et la mise en œuvre des recommandations du Comité du Patrimoine de L'UNESCO. Novembre 2019.
36	Pottier A., Catry T., Trégarot E., Maréchal J.-P., Cornet C., Fayad V., Failler P. (2018). Cartographie des biocénoses marines et des milieux terrestres du Parc National du Banc d'Arguin (Mauritanie) par imagerie satellitaire. In Trégarot et al. (2018). Evaluation des services écosystémiques du Banc d'Arguin, Mauritanie. pp. 33-62.
37	Rakhimberdiev, E., Duijns, S., Karagicheva, J., Camphuysen, C. J., Dekinga, A., Dekker, R., ... & Soloviev, M. (2018). Fuelling conditions at staging sites can mitigate Arctic warming effects in a migratory bird. Nature communications, 9(1), 1-10.
38	RÉPUBLIQUE ISLAMIQUE DE MAURITANIE. (2015) Rapport de l'Etat de Conservation du Parc National du Banc d'Arguin (PNBA) et la mise en œuvre des recommandations du Comité du Patrimoine de L'UNESCO. Novembre 2015.
39	Salim, M.A., and Abdulhaleem, H.S. (2016) Technical Report on a mission to Mauritania 25th of March - 2nd of April, 2016. The Arab Regional Center for World Heritage and International Union for Conservation of Nature. Internal technical report.
40	Seret. B, Naylor, G.J., (2016) Rhynchorhina mauritaniensis, a new genus and species of wedgefish from the eastern central Atlantic (Elasmobranchii: Batoidea: Rhinidae). Zootaxa. 2016 Jul 15; 4138(2):291-308. doi: 10.11646/zootaxa.4138.2.4.
41	Setälä, O., Norkko, J., Lehtiniemi, M. (2016). Feeding type affects microplastic ingestion in a coastal invertebrate community. Marine pollution bulletin, 102, 95-101.
42	Sidi Cheikh, M. A. and Al Dhafer, A. A. M. (2010). 'Assessment of a modernization reform in a public administration in Mauritania: The National Park of Banc d'Arguin'. Dubai: Dubai School of Government . [Electronic reference] . Accessed 5 June 2013.
43	State Party of Mauritania (République Islamique de Mauritanie) (2019). Rapport de l'État de Conservation du Parc National du Banc d'Arguin (PNBA) et la mise en œuvre des recommandations du Comité du Patrimoine de L'UNESCO. Novembre 2019.
44	Strahm, W., Debonnet, G. and Abdulhalim, H. (2014). 'Mission de suivi réactif Parc national du Banc d'Arguin (Mauritanie)'. Rapport de mission, mars 2014. (in French).
45	Trégarot E., Catry T., Pottier A., Cornet C., Maréchal J.-P., Fayad V., Sidi Cheick M.A., David G., Dia A.D., Fall A.D., Sarr O., El Valy Y., Wagne O.H., Meisse B., Kane E.A., Ball A.C., Haidallah M.S., Braham C.B., Dia M., Abdel Hamid M.L., Rey-Valette H., Salles J.-M., Ly D., Cissé C.B. et Failler P. (2018). Évaluation des services écosystémiques du Banc d'Arguin, Mauritanie. Rapport final pour le Parc National du Banc d'Arguin, 366 p.
46	UNEP-WCMC (2012). 'Banc d'Arguin national Park, Mauritania'. UNEP-WCMC World Heritage Information Sheets. [Electronic reference] . Accessed 7 June 2013.
47	UNEP. 'Action Plan for the Management of the Mediterranean Monk Seal (Monachus monachus)'. Tunis, Tunisia:Regional Activity Centre for Specially Protected Areas. www.rac-spa.orgsitesdefaultfilesactionplansmonkap.pdf. Accessed 26 May 2015.
48	Une trajectoire urbaine insolite en Mauritanie », L'Espace Politique [En ligne], 38 | 2019-2, mis en ligne le 28 février 2020, consulté le 06 juin 2020. URL : http://journals.openedition.org/espacepolitique/6562 ;; DOI : https://doi.org/10.4000/espacepolitique.6562

№	References
49	Vousdoukas, M.I., Ranasinghe, R., Mentaschi, L. et al. (2020). Sandy coastlines under threat of erosion. Nature Climate Change. 10, 260–263. https://doi.org/10.1038/s41558-020-0697-0
50	WWF (2013). 'List of Priority Global 200 Ecoregions: Canary Current'. [Electronic reference] . Accessed 3 June 2013.
51	Wetlands International (2013). 'Ramsar Sites Information Service'. [Electronic reference] . Accessed 7 May 2013.
52	Williams R., Wright A. J., Ashe E., Blight L., Bruintjes R., Canessa R., Clark C., Cullis-Suzuki S., Dakin D., Erbe C. (2015). Impacts of anthropogenic noise on marine life: publication patterns, new discoveries, and future directions in research and management. Ocean & Coastal Management, 115, 17-24.
53	whc.unesco.org/en/events/1052/. 'Two Marine World Heritage sites set the stage for a new twinning arrangement'. Working meeting to discuss twinning arrangement between Wadden Sea and Banc d'Arguin. Accessed 26 May 2015.
54	whc.unesco.org/en/news/1103. Banc d'Arguin National Park and Wadden Sea sign historic Twinning Arrangement. Accessed 22 May 2014.
55	whc.unesco.org/en/soc/3460. Banc d'Arguin National Park (Mauritania) (N 506). Decision: 40 COM 7B.85. (http://whc.unesco.org/en/soc/3460).