

**FAA Section 118(E) and 119(D) Environmental Analyses  
USAID/Senegal, December, 2005**

**1. Introduction**

This report is USAID Senegal's response to the requirement in the Foreign Assistance Act, Sections 118 (e) and 119 (d) that stipulates every new strategy should consider biodiversity and tropical forest analyses. Sections 118(e) and 119(d) of the Foreign Assistance Act specifically state that for biodiversity:

“All country-level Operating Unit Strategic Plans must include a summary of analyses of the following issues: (1) the actions necessary to conserve biological diversity, and (2) the extent to which the actions proposed meet the needs thus identified.”

And for tropical forestry:

“For country-level Strategic Plans that cover countries that have any part of their territory within the tropics, each Strategic Plan must also include (1) a summary of their analyses of the actions necessary to achieve conservation and sustainable management of tropical forests and (2) the extent to which the actions proposed meet the needs thus identified.:

For the purposes of this report, biodiversity is defined as<sup>1</sup>:

“Biological diversity, or biodiversity, is the variety and variability of living organisms...The Earth's biodiversity consists of genes, species, and ecological processes making up terrestrial, marine and other aquatic ecosystems that both support and result from this diversity. All of these elements of living systems interact with each other to produce the web of life on Earth – the biosphere – a whole much greater than the sum of its parts”

This Tropical Forestry (FAA 118) and Biodiversity (FAA 119) Analysis has been developed concurrently with the development of a new five-year strategy for USAID/Senegal's overall assistance program. It was derived from existing reports and analyses on biodiversity and from interviews with key government officials in Ministry of Environment and Nature Protection. It is intended to be supplemented by a more in-depth analysis during the first year of the programs implementation.

**2. Country context**

Senegal comprises an area of 196,722 km<sup>2</sup>, which is mostly flat without any pronounced relief. A quarter of its territory is arid. As in much of West Africa, environmental degradation has placed intense strains on Senegal's agriculture and natural resources and threatens economic livelihoods. Once expansive forests are in danger of disappearing, which negatively affects rural incomes, biodiversity and stability.

**a. Biophysical aspects**

Climate: Senegal has a harsh climate with generally high temperatures, and low to moderate rainfall. The rainy season is limited to a seasonal monsoon, wetter in the south than in the north. The average rainfall varies between 200 – 400 mm from July to September in the north, 400 – 700 mm in the center, and 700 – 1000 mm from May to October in the south. Variations in amounts and timing of annual rainfall cause fluctuations in productivity of the agricultural, livestock and forestry sectors and make food security an issue for most rural dwellers.

Water Resources: The availability of water to a great extent governs land use and conditions of health or existence among most rural populations living at the subsistence level, and also affects the condition of the Senegalese economy. Water supply in the country is erratic, dependent largely on

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<sup>1</sup> USAID, 2002.

rainfall that varies greatly in amount, distribution and frequency from year to year. Groundwater reserves are still relatively abundant.

Senegal has four major rivers: Senegal, Sine-Saloum, Gambia and Casamance. Because of low rainfall and the high evaporation rate, there are practically no permanent surface bodies of significance except for the Lac de Guiers which is replenished by the floods of the Senegal River regulated by two dams. A general decrease in rainfall over the past 30 years has also affected the flood volumes of the main rivers. As a result, large areas previously occupied by mangroves near the mouths of the Sine-Saloum and Casamance Rivers have been converted into salt ponds (*tannes*). This means less floodplain agriculture and rangelands, less water for fish breeding and production and decreased habitat for other aquatic animals.

Soils: The soils of Senegal range from dry sandy soils in the north, to tropical ferruginous soils in the central region, and to ferralitic soils in the south. Overall, soil fertility is low and soils are mostly fragile, making them highly susceptible to water and wind erosion. The soil texture of most fresh water river valleys tends to be high in clay and loam content. They are classified as "generally good soils", i.e., they do not have serious limitations and are able to produce good yields of suitable, climatically adapted crops. Most cultivated soils located in the Peanut Basin are "generally poor to moderate soils". These soils have one or more limitations that restrict their use, are usually of fairly low natural fertility, and generally give low to moderate yields of climatically adapted crops under traditional systems of management.

Terrestrial Ecosystems: Senegal's natural landscape grades from the Sahelian grasslands of the north with their widely spaced brushes and trees, to rainforest in the southern lowlands and mangrove swamps in the Lower Casamance region. Senegal displays a typical Sahelian fauna and flora. The extreme dryness experienced by Senegalese ecosystems during the 8-month-long dry season affects biomass production and renders natural vegetation highly susceptible to bushfires. Approximately 40 percent of the country is burned each year, provoking the destruction of pasture, crops, forests and sometimes habitations.

Marine ecosystems: Senegal's coasts are very productive for pelagic fish species. Senegal's river estuaries and deltas serve also as important nurseries for coastal fish, shellfish and shrimp. However, the habitat that supports the fishing industry is being degraded and the stock is being overfished. Nursery grounds that are accessible to marine species in the Senegal River Delta are only 5% of what they used to be. Animals that rely on fish for food, such as endangered sea turtles, birds and dolphins, are also affected by the decrease in the fish populations.

## **b. Socio-economic context**

The population of Senegal is growing at a relatively high rate of 2.6 percent per year, having increased from approximately 3.2 million at independence in 1960 to about 10 million currently. As a result of this rate of increase, nearly 45 percent of the population is under the age of 15. Gross domestic investment rates (23% of GDP in 2003) are too low to raise the real growth rate to the 7.5 percent range essential to generate increased income and employment needed to accelerate the pace of poverty reduction. While Senegal's 4.3% average economic growth rate over the past decade is laudable, stronger economic growth is needed to meet the Millennium Development Goal of halving poverty by 2015.

Over 60% of Senegal's population relies on agriculture for their livelihoods (17% are in fisheries) and another 20% depend on income from agricultural secondary markets. Agriculture and fisheries contribute only 12% of GDP but represent about 57% of exports, indicating that there is room for increased growth. The actual amount of suitable agricultural land is low (19%) so population density figures can be misleading. Actual population density in productive lands can reach over 300 people/hectare. Most of this suitable land is rain-fed agriculture, with only 1.5% under irrigation. Rain-fed agriculture remains a low investment, low yield activity and won't be able to contribute more significantly to GDP until private sector investments are increased, agriculture is further diversified, and new technologies adopted.

Peanuts have been the main cash crop for over 150 years and the soils in the peanut basin are greatly depleted of nutrients. These impoverished soils are forcing people to migrate towards areas of

higher soil fertility, mostly towards the forested southern regions. As the population grows, and migrates into areas of higher agricultural productivity, conflicts between different land uses and populations will continue to occur and perhaps become more frequent. These conflicts are exacerbated in transboundary areas and have been one of the main causes of the regional conflicts in the Casamance and other areas.

Senegal's rural population is also highly susceptible to droughts and other disruptions in agricultural production and therefore frequently at risk of food insecurity. During droughts or periods of poor cereal production, farmers migrate towards the ocean to take up fishing, adding additional strain on that resource. Fisheries supply 70% of the animal protein consumed in Senegal.<sup>2</sup> In 2002, the fishing industry contributed 2.3% to the GDP and about 12.5% of the GDP of the primary sector. The World Bank reports that Senegal's fisheries employ both directly and indirectly some 600,000 people which is roughly 17% of the country's active workforce. Within the last ten years, the amount of fish caught has been abundant with 398,000 tons caught in 1999 representing a commercial export value of over US \$300 million. However, from 1999 to 2002, there was a steady decrease of 10% of the total landing of the fisheries sector from 398,000 tons to 341,000 tons. Since 2003 there has been an increase to 470,000 of fish caught, partly due to new management policies for opening and closing fishing seasons. Fish is the number one export representing between 25% and 30% of the country's total exports.<sup>3</sup>

### c. Institutions, policies and laws affecting conservation

The policy environment for natural resource management and biodiversity conservation has improved over the last 10 years. Senegal now has a broad legal basis for environment and conservation, yet many of the laws are not yet fully applied and some contradictions remain. Senegal has signed and ratified all the Rio international conventions. With USAID funding, a **National Environment Action Plan (NEAP)** was completed in 1997 that lays the framework for cooperation among all ministries for environmental policy and dialogue. This resulted in the new **Environment Code** that was established in 2001. The NEAP was also followed by the **National Plan to Fight against Desertification** to develop specific actions to combat desertification. A **Biodiversity Strategy** was adopted in 1998 that lays out priority areas for biodiversity conservation. The **Decentralization Code** of 1996 has had considerable impact on how the environment is managed as it transferred jurisdiction for natural resource management to local governments. The **Forestry Code**, revised in 1998, set conditions for the transfer of forest management to local governments which included the development of forest management plans. A new **Forestry Action Plan** was developed in 2005 to improve implementation of the Forestry Code. Senegal's Hunting Code is outdated and does not comply with the Decentralization Code but is currently being updated. No **Pastoral Law** exists so there are no clear policy directives on how transhumance is to be managed, a continual source of land conflicts. Land tenure is governed by the outdated **National Domain Law** of 1964 that nationalized land to intensify agricultural production. Due to this law, the local populations lost their customary management rights over their ancestral lands; including fallow and land reserves. This law does not recognize either pastoralism or natural forest management as proper land uses or tenure.

### 3. Status of Biodiversity

Senegal has established a network of national parks and wildlife reserves that provide a rather complete representation of natural ecosystems existing in the country. There are 7 national parks and 8 reserves which occupy some 8% of the land area of the country. In 2005, Senegal created 5 new protected coastal areas bringing the total to 12 protected areas. Table 1 shows the existing terrestrial protected area system. This considerable amount of land area placed under protected status has salvaged vestiges of the initial biodiversity, but the overall situation is alarming. Most of the original wildlife has decreased in recent years in the face of human encroachment. The protected areas have suffered from heavy commercial poaching in the past, and these areas tend to be under-staffed, under-equipped and under-funded to provide adequate protection.

Because of the vastness of the protected estate and the numbers of forest reserves (more than 200 reserves covering originally 2,519,000 hectares), the current biophysical status of Senegal's protected

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<sup>2</sup> As stated in section 36 of "Republic of Senegal, Fishery Sector Strategy", June 14, 2005.

<sup>3</sup> As stated in section 31, 33 and 34 of "Republic of Senegal, Fishery Sector Strategy", June 14, 2005.

area network is not well known today, although the loss of the major wildlife populations is well documented. The larger national parks such as Niokolo Koba, Djoudji and the Saloum Delta are better known. The remaining natural habitats and biodiversity are valuable (see Sene, 2004) and the marine and coastal protected areas are especially rich in biodiversity and provide important sources of revenue. This natural capital is being lost, yet could be an engine for rural growth through tourism, improved fisheries, or promotion of markets for natural products.

The Niokolo Koba National Park in Tambacounda covers over 900,000 ha and is the most valuable and extensive conservation park in Senegal. Although registered as both a World Heritage site and a Man and the Biosphere (MAB) Reserve it has been heavily poached in the past and has suffered from the great droughts of the 1970's. The Djoudji National Park, a 16,000-hectare area established as a migratory bird reserve is well protected but suffers from the construction of an anti-salt dam in the Senegal River. This has dramatically reduced the nesting areas of some species. The Saloum Delta National Park with its 73,000 ha has a village within its small forest and has practically no remaining large wildlife, yet the delta itself is rich in marine life.

Table 1: Protected Areas in Senegal

Protected Area	Date Created	Size (hectares)	International Conventions
Niokolo Koba National Park	1954,1969	913,000	Man and Biosphere Reserve
Lower Casamance National Park	970	5,000	World Heritage Site
Djoudj Bird National Park	1971,1975	16,000	World Heritage Site,
Saloum Delta National Park	1976	76,000	Ramsar Site
Biosphere Reserve of the Saloum Delta	1981	180,000	Man and Biosphere Reserve
Langue de Barbarie National Park	1976	2,000	Ramsar site, REDBIO site
Iles de la Madeleine National Park	1976	45	
Ornithological Reserve of Kalissaye	1978	16	
Special Wildlife Reserve of Guembeul	1983	720	
Popenguine Natural Reserve	1986	1,009	Ramsar Site
North Ferlo Wildlife Reserve	1972	487,000	
South Ferlo Wildlife Reserve	1972	663,000	
Samba Dia Biosphere Reserve	1981	763	
Ndiael Special Wildlife Reserve	1981	-	

Tappan (Tappan et al, 2004) provides a comprehensive overview of the status and trends of ecoregions in Senegal. Based on 40 years of satellite imagery, aerial surveys and fieldwork, Tappan concludes that at the ecoregion scale the decline in Senegal's biodiverse forests is of particular concern, but the rate of agricultural expansion has slowed and savannas, woodlands and forests still cover more than two-thirds of the country.

Table 2: Ecoregions of Senegal

Ecoregion	Area (km <sup>2</sup> )	Predominant vegetation
1. West Central Agricultural Region, or "Peanut Basin"	25,915	agricultural tree parkland, dominated by two species of acacia
2. Senegal River Valley	6,323	open steppes, shrub steppes, and localized acacia woodlands
3. Northern Sandy Pastoral Region	24,763	open shrub steppes and grasslands
4. Ferruginous Pastoral Region	30,908	shrub savannas, and bushland, often relatively dense
5. Southern Sandy Pastoral Region	10,852	shrub and tree savannas
6. Niayes, or Long Coast	1,049	shrub savanna; wetlands fringed with trees in interdunal depressions ( <i>niayes</i> )
7. Saloum Agricultural Region	6,413	agricultural tree parkland; a few degraded wooded savannas and woodlands
8. Agricultural Expansion Region	8,436	degraded shrub and tree savannas; somewhat denser in the south; open agricultural parkland in the broad valleys
9. Eastern Transition Region	27,869	tree savannas and wooded savannas; small areas of agricultural parkland
10. Shield Region	28,660	open to dense wooded savannas, and grasslands on laterite
11. Casamance	24,540	predominately wooded savannas and woodlands; grasslands
12. Estuaries	4,095	on laterite; riparian and gallery forests; parkland mangroves and halophytic vegetation of tidal flats

Adapted from Tappan, 2004

Within the boundaries of Senegal are a number of species at the northern limit of their geographic range, such as chimpanzee, elephant, hippopotamus and buffalo. Other species present are at their most southerly point of occurrence, including some Palearctic migrant birds, among them the gull-billed tern and little tern.

The relatively low biodiversity of Sahelian terrestrial habitats is in contrast to the presence of rich coastal and marine life forms where urban pollution or mismanagement has not destroyed them. The Saloum Delta National Park (76,000 ha) consists mainly of mangrove swamps which is among the largest and best preserved in Africa. The park is a RAMSAR wetland site and serves as breeding habitats for various bird species and for manatees, dolphins and marine turtles, and as important staging areas for migratory birds from Europe.

The southern forest zone in the Tambacounda region has six protected areas comprised of four classified forests, one national park and one hunting reserve. The gallery forests in the Niokolo Koba system represents 78% of the gallery forests in Senegal and consists of palms, raphias as well as marsh prairies. Of the 31 plant species considered endemic to Senegal, 12 are present in this zone and 8 are considered endangered. This zone contains 80 species of mammals, around 330 bird species, 36 reptiles, 60 fish species, 2 amphibians and about 1500 plant species. Because of the diversity of habitats and the large size of this park, species richness is high, although the number of endemic species is not exceptional.

This ecosystem houses the only viable population of the rare Eland de Derby (*Tragelaphus derbianus*) in the sub-region. The park is equally the last refuge for the elephant (*Loxodonta africana*) in Senegal and around 150 chimpanzees (*Pan troglodytes*) live in the gallery forest in and around the park. Many of the remaining large mammals are protected because they are close to extinction locally (including elephants, leopard, cheetah, hippopotamus, red-fronted gazelle, giant eland, chimpanzee, ostrich, marabou stork, crocodiles and lions). Table 3 gives a break-down of species diversity throughout the country.

Table 3: Species Diversity in Senegal

Class	Family	Genus	Species	# Endemic	# Threatened
<i>Animals:</i>					
Fish	110	194	400	4	10
Amphibians	2	2	2	-	-
Reptiles	20	58	100	-	38
Birds	100	300	623	-	-
Mammals	32	65	192	-	14
Insects	300	?	2000	-	-
Mollusks	111	231	700	-	-
Crustaceans	18	25	64	-	-
<i>Plants:</i>					
Gymnosperms	3	3	4	-	-
Angiosperms	162	997	2457	31	50

Adapted from MEPN. 1998. Monographie National sur la Biodiversité au Sénégal

#### 4. Status of Tropical Forests

Classified forests cover an area of 2.5 million hectares in Senegal and an estimate of unclassified forests based on remote sensing indicates approximately 600,000 hectares of open forest and 4,800,000 hectares of wooded savanna in the southern half of Senegal. These unprotected forests contribute significantly to the fuelwood supplies of small villages and urban areas including Dakar. All forests are under increasing pressure to provide firewood for a growing population and construction material. They are also subject to slashing and burning for the expansion of new agricultural lands and to the ravages of bushfires.

The rate at which the forests are shrinking is estimated at a rate of 0.5 percent per year. Urban need for domestic energy has created a large and burgeoning demand for charcoal. Harvesting and supplying this wood to the cities and urban areas in Senegal is still presently being achieved by cutting the natural forest areas. While there are some opportunities for both charcoal substitution and transformation technologies, it is apparent that the magnitude of demand will, for the foreseeable future, have to be met from these same forest areas. Properly managed, the existing forest estate is able to sustainably provide charcoal for the foreseeable future.

The Forestry Department is expressing a willingness to more actively transfer forest management to local communities as foreseen under the Decentralization code. To date, approximately 200,000 hectares have been transferred to community control for their control and profit. Sene (2004) lists the substantial value of these forests through improved marketing of its products (various gums, fruits for juices, and others for use in the pharmaceutical or cosmetic industries). However, forest taxes are substantial and are more of a disincentive to the responsible management and production of environmentally friendly products (Clausen, 2003).

#### 5. Threats to Biodiversity

##### a. Direct threats

The major threats to biodiversity have been identified in Senegal's National Biodiversity Strategy and include natural causes (drought and its consequences, water and soil degradation and salinisation, wind and water erosion) and human causes (bush fires, over exploitation, land clearing , hydro-

agricultural works, fragmentation and destruction of habitats, poaching and pollution). These are further elaborated on below.

Encroachment of Agricultural Lands: Increased environmental damage caused by erosion, drought, population pressure and poor farming practices is leading to the overuse of pasture land and decreasing soil fertility. These pressures threaten subsistence agriculture and thereby cause some people to look increasingly toward the southern forests for fuel wood and potential farmland. New lands are cleared primarily for expansion of groundnuts which contributes to the destruction of forested areas. This harmful trend has continued and the peanut front has currently reached some classified forests and reserves (Mbegue/Khelcom and Pata). The demand for increased food and export crop production has also forced the extension of agriculture into fragile marginal shrub-covered lands that have become susceptible to erosion by poorly adapted techniques of cultivation.

Land Tenure: The current land tenure system is an impediment to long-term investments in land enhancement and improved land stewardship. Open access to resources makes the “tragedy of the commons” the prevalent situation with most of the communal/ public lands in the country. Existing tenorial arrangements recognize agriculture as the only land use conferring land rights. Land tenure problems can only be stabilized, or reversed, as more agricultural practices and natural resource technologies are widely adopted and recognized by government as appropriate land uses.

Charcoal Production: Charcoal production is currently being managed on a quota system to ensure sufficient charcoal is produced to meet urban needs and are mostly given to the large, influential charcoal cartels. No forest management planning is conducted to ensure a sustainable supply of this charcoal. The Forestry Department is gradually changing this system to one where communities develop forest management plans and produce charcoals. Eventually quotas will be eliminated and there will be more local management and profit from the charcoal trade. Until this happens, the current charcoal production system will continue to be a threat to the remaining forests.

Illegal Logging: No large scale commercial logging operations exist in Senegal. However, small sawmills exist in the Casamance and areas of Tambacounda that supply the artisanal demand for wood for crafts. The Government requires that sawmills have permits but it is not linked to any forest management criteria or inventory. The Government lacks the capacity to enforce its own regulations and monitor the activities of the companies, which leads to the indiscriminate exploitation of wood.

Hunting: Senegal has a system where it leases the rights to hunt in specific areas to concessionaires. Hunting is generally limited to warthogs, guinea fowl and franklins but special permits for larger game can be requested in the Faleme Hunting Preserve. 66 concessionaires have leased the rights for about 2.6 million hectares. While these concessions can be an important source of revenue, hunting quotas are given yearly but are not based on any wildlife surveys and are therefore unsustainable.

Fishing: Senegal’s coastal waters are being over fished. An Economic and Sector Work (ESW) report by the World Bank concluded that the current management of Senegal’s coastal resources has caused the artisanal and industrial fisheries to have a considerable overcapacity. The ESW reports that the fishing sector will only recover if the capacity of the fishing industry is reduced; fish stocks are allowed to recover and, afterwards, the fishing levels remain at a sustainable level. A point of particular concern in the crisis is the decline in the coastal demersal resources, such as groupers, breams, shrimp, octopus and cuttlefish, all of which represent the bulk of exports.

Trawling practices in particular have caused much harm to the marine ecosystem. For instance, the nursery grounds that are accessible to marine species in the Senegal River Delta are only 5% of what they used to be; pollution by sewage has inundated the shores of the Cap Vert peninsula which includes Senegal’s only coral reef; animals that rely on fish for food, such as endangered sea turtles, birds and dolphins, are also affected by the decrease in the fish populations.

#### **b. Indirect threats and root causes**

The following are indirect threats to biodiversity, identified in the National Biodiversity Strategy and elaborated from other sources:

Incomplete Decentralization: Transfer of responsibility for environment and natural resources to the local governments through decentralization has not been accompanied by a transfer of human and financial resources or training. The lack of funds and human resources at the local government level has slowed progress in their capacities to manage responsibilities transferred to them, including natural resource management.

Inadequate policies and laws: Inadequate regulations concerning land tenure; access to biological resources and the controlled exploitation of resources are major policy concerns identified in the National Biodiversity Strategy. Regulations for biodiversity conservation have not been fully developed, creating challenges for their proper management. Local governments are responsible for managing their resources, yet approval must be sought from the Forestry Service before any forestry resources can be extracted. In protected areas where government maintains management authority, policies aren't flexible enough to allow profit sharing with local communities.

Rigid Protected Area System: Some constraints to managing protected areas, identified in the Biodiversity Strategy, include *inter alia*: rigid policies that don't allow profit sharing with surrounding communities, inexistence of buffer zones, lack of border delimitation, guard system not sufficiently staffed or financed, tense relationship between park managers and surrounding villages, increased hunting concessions around the periphery of the parks, and lack of community inclusion in management planning.

Biodiversity conservation management not integrated: There is insufficient integration of biodiversity conservation in activities such as agriculture, rangeland management, land use plans or economic development strategies.

## **6. Links to USAID strategy and Program**

### **a. Extent to which proposed USAID action meets need**

USAID/Senegal's new strategy includes a biodiversity component under the Strategic Objective (SO) for "Increased Economic Growth through Trade and Natural Resource Management." This SO has results addressing the USAID program component for "Improved Sustainable Management of Natural Resources and Biodiversity Conservation." Other Strategic Objectives such as Health and Education meet biodiversity needs only indirectly through long-term efforts to create a healthier, educated population.

Recognizing that continued growth depends on the sustainable use of the resource base, the new EG SO will directly address broader issues to ensure biodiversity conservation. A clear link has been made between the conservation of natural capital, increased economic opportunities and local governance that will be further expanded upon through this program. An emphasis will be placed on ecosystem management in the south-eastern forested areas of Senegal and the coastal regions of Casamance and the Sine-Saloum Delta.

A major focus of this new SO will be to increase trade and competitiveness of the private sector through the development of the agriculture and natural resources sector. Using the Nature, Wealth and Power approach pioneered by USAID, the program will focus on the sustainability of these efforts on the local level. This will include the further development of land use and natural forest management plans in areas targeted because of their importance to biodiversity conservation.

To this end, the program intends to develop a more in-depth analysis on biodiversity threats and opportunities during the first year of this strategy's implementation. This analysis will inform the program on where and how to best invest to have the greatest impact on biodiversity conservation.

### **b. Threats from proposed USAID activities**

Overall there will be little, if any, threat of USAID/Senegal's proposed activities on biodiversity and tropical forests. None of the proposed strategic objectives are expected to have an adverse impact on biodiversity or tropical forests. Since the program includes a biodiversity and natural resource management component the overall strategy is expected to have a positive effect of biodiversity trends.

In compliance with 22 CFR 216, USAID/Senegal will establish a system of environmental review and screening for activities that may have a potential environmental impact. To this end, an initial environmental examination will be completed for all new strategic objectives.

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