



ATLAS USE CASE: CONSERVATION AREA PLANNING

Cambodia Mekong Delta Digital Atlas - CAM-MeDiA

1. Sustaining biodiversity in the context of climate change

Through the 2008 Protected Areas Law and subsequent declaration of Biodiversity Conservation Corridors in 2017, nine types of protected areas are designated within Cambodia: national park, Ramsar site, wildlife sanctuary, biosphere reserve, protected landscape, multi-purpose-use management area, natural heritage site, marine park, and biodiversity conservation corridors (ODC 2017). As of 2017, there were nearly 50 protected areas representing about 40% of Cambodia's total land area.

Protected areas located within the Cambodian Mekong Delta include the Phnom Aural Wildlife Sanctuary, Preah Soramrit-Kosomak "Kirirom" National Park, Southern Cardamom Mountains National Park (eastern fringe only), Boeung Prek Lpeou Protected Landscape, and Koe Seima Wildlife Sanctuary. The latter sanctuary intersects with the eastern part of the delta, whereas all other protected areas are situated in the western delta region, apart from relatively small Boeung Prek Lpeou Protected Landscape located in the southeast corner of Takeo province.

Key Biodiversity Areas (KBAs) further supplement the officially designated protected areas and identify important sites of high biodiversity value.

The future sustainability of biodiversity requires consideration of the potential impacts of future climate change and socio-economic impacts such as those associated with land use changes, and infrastructure development.

Studies indicate future climate change will lead to intensified drought in the southern part of the Mekong Basin, and increased flood depths and durations across the Mekong Delta (Evers & Pathirana 2018). By the 2030s across the Mekong basin, average temperature is projected to increase by 0.79°C and increases in precipitation by up to 13.5% which will be mostly evident during the wet season (MRC 2010).

“*The digital Atlas seeks to improve understanding of the potential consequences of future climate change on infrastructure assets, agriculture and natural ecosystems of the Cambodia Mekong Delta.*”

The Cambodia Mekong Delta Digital Atlas (CAM-MeDiA) provides insight into potential future changes of temperature, precipitation, flood, and drought across the delta. Regarding changes to temperature and precipitation, the Atlas incorporates three global climate models (GCMs)ⁱ and displays outputs from three scenarios (RCP 4.5, 6.0 and 8.5)ⁱⁱ for both the dry and wet seasons, and annually.

Using the most up-to-date data and information available, the Atlas can support MoE in assessing the future potential loss of existing protected areas, and opportunities for expanding and developing new sites for conservation. The Atlas enables users to overlay the existing network of protected areas, and also KBAs and community protected areas, over future projected climate change variables (mean change of maximum temperature and mean percentage change in precipitation), and on projected changes in future drought and flood. Such insights will give MoE critical information to guide planning to ensure the conservation of biodiversity across the Cambodia Mekong Delta.

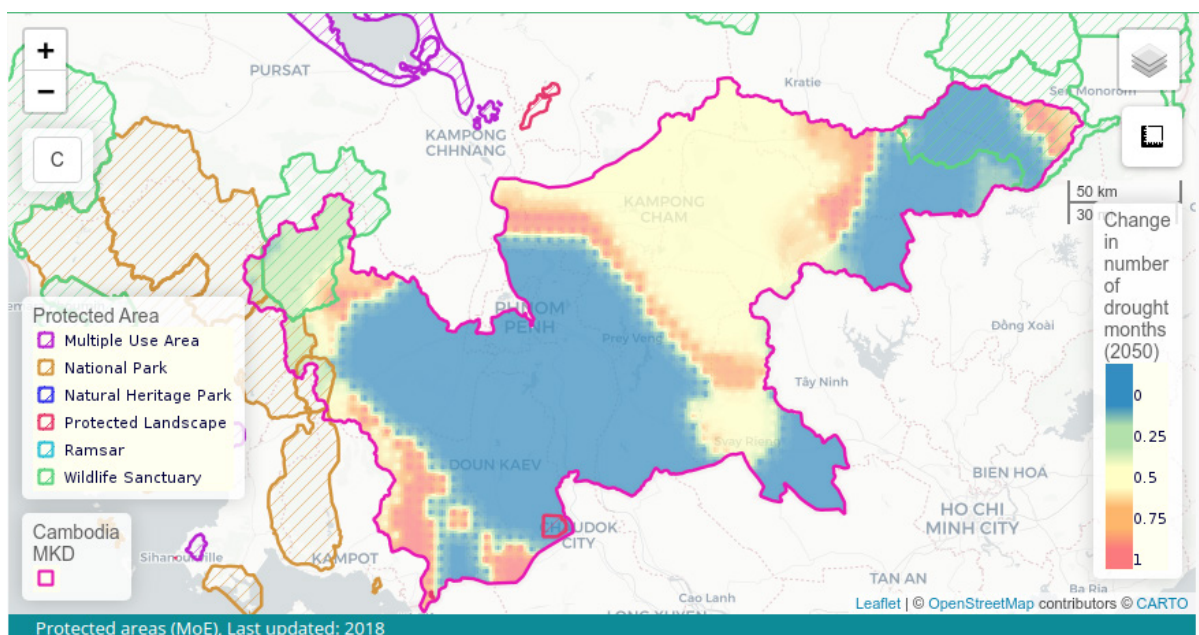


The Ministry of Environment (MoE) is responsible for conservation of biodiversity, protection of natural resources, and sustainable management of natural resources. With regard to protected areas management, MoE is tasked with identifying and delineating protected areas (RGC 2008, article 14).

2. CAM-MEDIA maps

Overlaying areas of high biodiversity value on future projected changes in temperature, precipitation, flood and drought can provide insight into sustaining biodiversity across the delta. In particular, **delineation of potential future hotspots of change for climate, flood and drought** will enable identification of existing protected areas that are most at risk, and provide valuable information on opportunities to offset possible losses by expanding and developing the protected areas network in other locations.

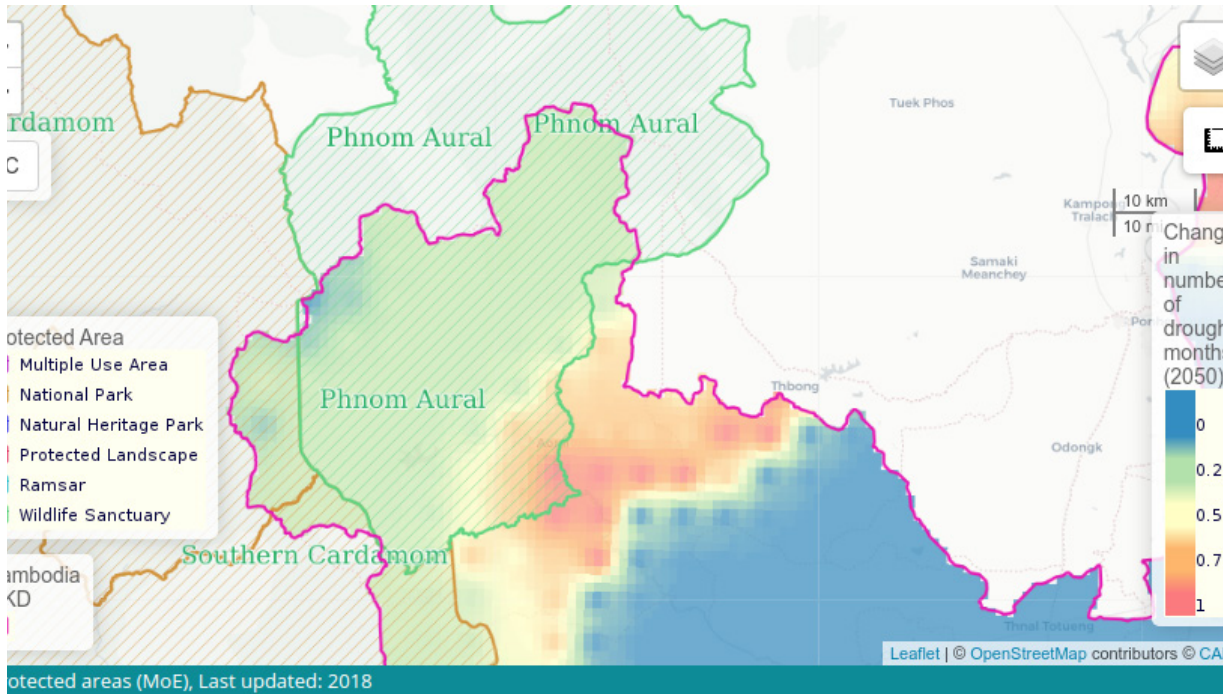
Cambodia Mekong Delta: overlaying of protected areas network on projected changes in drought months in the 2050s



In this example, boundaries of Protected Areas are overlain on future projected drought (the layer selected is the *Change in number of drought months (2050)*). Note that protected areas

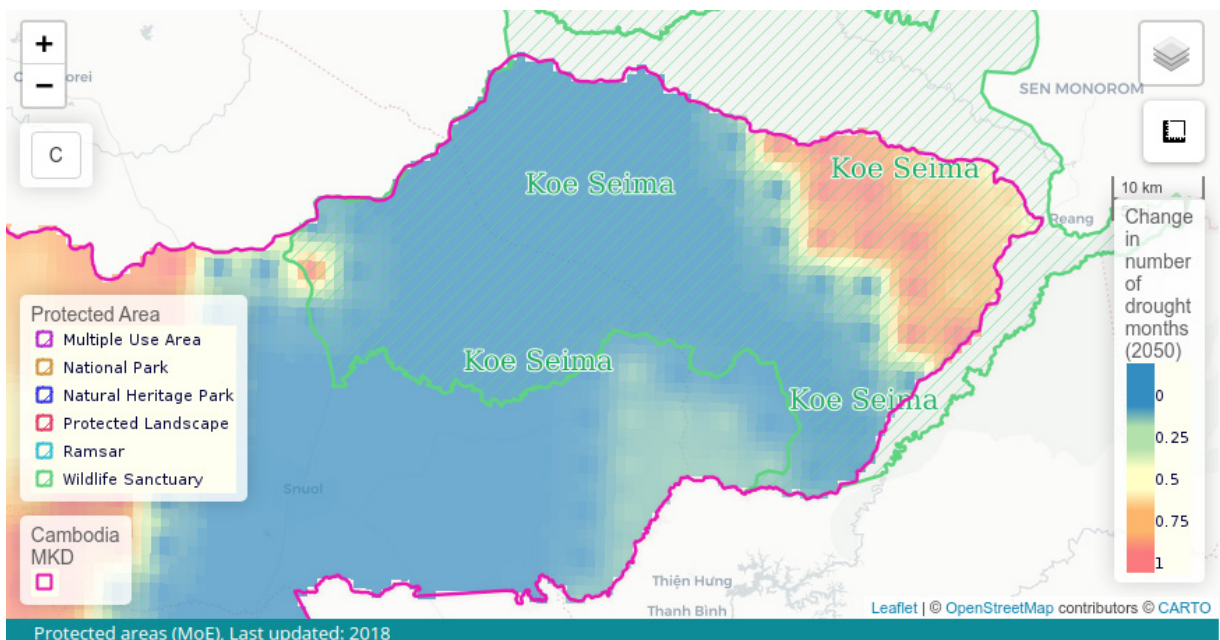
intersect with the western and eastern fringes of the Mekong Delta and thus the projected future drought layer can inform protected areas planning in the context of this particular future drought condition.

Cambodia Mekong Delta (western region): overlaying of protected areas network on projected changes in drought months in the 2050s



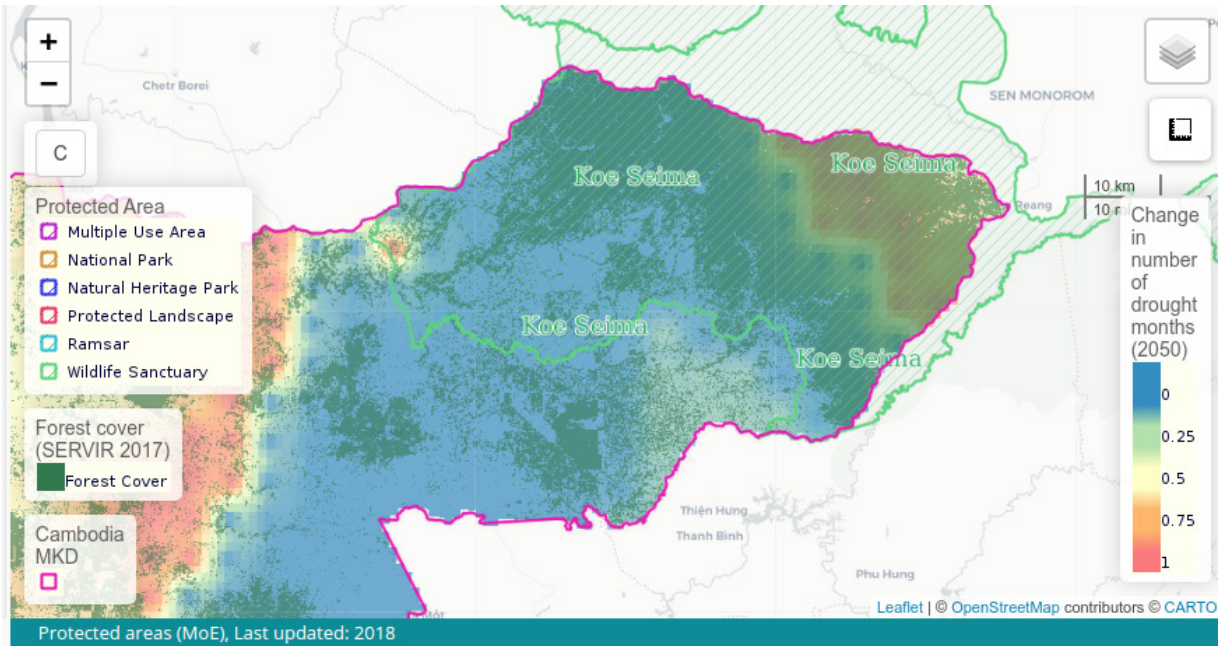
In the western area of the Delta, which intersects with the Phnom Aural Wildlife Sanctuary, the presence of orange areas indicates that in the 2050s these areas will experience prolonged drought, especially in the eastern area of the wildlife sanctuary.

Cambodia Mekong Delta (eastern region): overlaying of protected areas network on projected changes in drought months in the 2050s



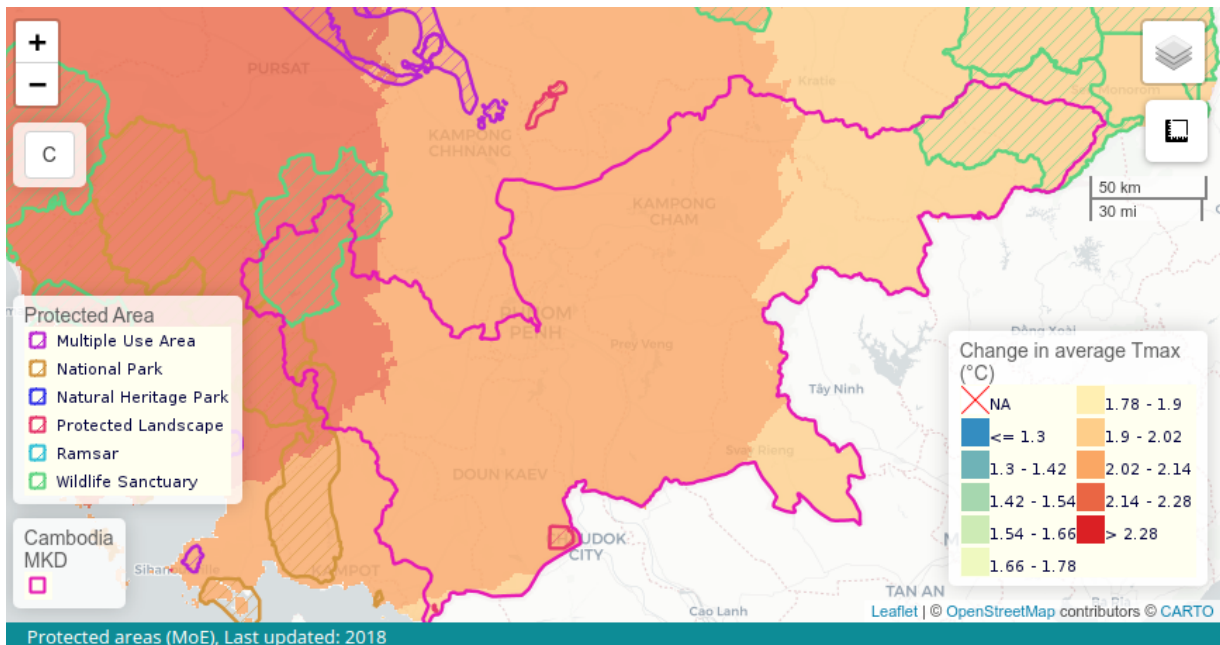
In the eastern area of the Delta, which intersects with the Koe Seima Wildlife Sanctuary, the presence of orange/red areas shows that in the 2050s these areas will experience prolonged drought.

Cambodia Mekong Delta (eastern region): overlaying of forest cover and protected areas on projected changes in drought months in the 2050s



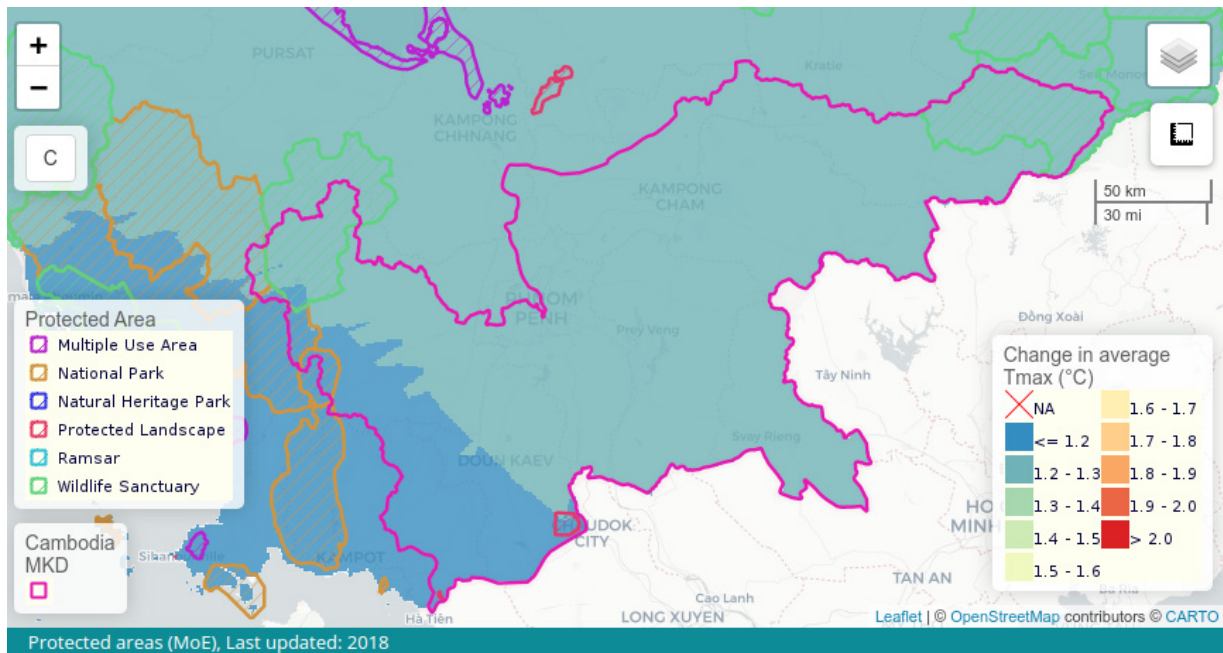
Given that the eastern area is considerably forested, as shown above with the SERVIR 2017 forest cover dataset, increased drought may increase the risk of forest fire, which would also be a concern to local communities such as those engaged in tourism. Thus the Atlas offers potential for identifying locations of increased fire risk and associated threats to livelihoods in the future.

Cambodia Mekong Delta: overlaying of protected areas on projected changes in average Tmax in 2060s (RCP 8.5, dry season, GCM: GISS-E2-R-CC).



Projected increases in maximum temperature in the 2060s during the dry season are overlain by protected areas. Temperature increases of ~2°C are projected by the 2060s for the more extreme emissions scenario (RCP 8.5) and thus may contribute to future increased drought and fire risk. The western region of the Mekong Delta shows the greatest increase in average maximum temperature in this example.

Cambodia Mekong Delta: overlaying of protected areas on projected changes in average Tmax in 2060s (RCP 4.5, dry season, GCM: GFDL-CM3).



It is important to consider the range of plausible future changes in temperature (and precipitation), which requires that alternative scenarios (RCPs) and GCM models should be consulted. For example, this image shows projected changes in average Tmax in the 2060s of approximately 1°C for the RCP 4.5 scenario (intermediate emissions scenario) and GFDL-CM3 model.



3. Bibliography

ODC (2017) Protected areas. Open Development Cambodia. <https://opendevelopmentcambodia.net/topics/protected-areas/>. Last accessed 31 March 2020.

Khmer Times (2017) Six sanctuaries proposed. October 25, 2017. <https://www.khmertimeskh.com/87603/six-sanctuaries-proposed>. Last accessed 31 March 2020.

MRC (2010) State of the Basin Report 2010. Mekong River Commission, Vientiane, Lao PDR.

RGC (2008) Protected Area Law. January 2018. Royal Government of Cambodia. http://portal.gms-eoc.org/uploads/resources/952/attachment/Cambodia_Law_on_Natural_Protected_Areas_15_Feb_2008_En.pdf. Last accessed 31 March 2020.

The Phnom Penh Post (2017) Newly protected areas to span 1.5M hectares. 30 January 2017. <https://www.phnompenhpost.com/national/newly-protected-areas-span-15m-hectares>. Last accessed 31 March 2020.

ⁱ Global climate models (GCMs) are mathematical models used to generate future projections of climate change. Various research teams internationally have developed GCMs and these are used to examine the consequences of climate change. An evaluation of outputs from a selection of GCMs are required to determine the plausible range of projected climate variables such as maximum temperature and precipitation.

ⁱⁱ Representative Concentration Pathways (RCPs) represent different scenarios of future projected climate change or climate futures which are defined by different greenhouse gas concentrations. RCP 8.5 represents the highest emissions scenario (or worst case scenario), and RCP 4.5 is described as an intermediate scenario.

This fact sheet is the second in a series of use cases prepared by ICEM for the World Bank under the project titled Cambodia Mekong Delta Digital Atlas (CAM-MeDiA).



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP



icem

Climate Change | Biodiversity
Water | Integrated Assessments