



# Investigating the effects of climate change on national parks in Iran



Naghmeh Mobarghaee<sup>1</sup>, Houman Liaghati<sup>2</sup>, and Saba Shokrollahi<sup>3</sup>

- 1- Shahid Beheshti University, Environmental science research Institute, Department of Environmental Planning, Tehran, Iran.
- 2- Shahid Beheshti University, Environmental Sciences Research Institute, Department of Environmental Economy- Tehran, Iran.
- 3- University of Tehran, Faculty of Natural Resources, Karaj, Iran.

## Introduction

- A national park is a large area of nature that governments protect its ecosystem and create a safe and suitable environment for the growth and reproduction of plant and animal species with a rich biodiversity. These natural areas include forest, pasture, grove, plain, river, lake and mountain. Also, national parks are suitable areas for educational, research and tourism activities, which have special ecological values. For the proper protection of biodiversity, genetic resources, ecological integrity and landscapes, any human activities other than conservation measures are prohibited in these areas. For this reason, national parks have a stronger legal support than other protected areas. However, local residents benefit from the ecosystem services produced by these national parks. In Iran, since 1970, 31 national parks have been registered in 17 provinces of the country with an area more than 2 million hectares, which include different climatic conditions, animal species and vegetation of country.
- Climate changes in recent years have left many effects in Iran. Therefore, these effects on national parks as hotspots with biological diversity can be seen with greater intensity. Surveys show that in Iran, climate changes show themselves mostly with an increase in temperature and a decrease in precipitation. In this research, the effects of climate change on the country's national parks have been estimated using climate change measurement and prediction models. The results show that a large part of national parks in the country are exposed to moderate to severe climate changes, which shows the necessity of adaptation policy in these ecosystems.
- Iran was the world's eighth largest emitter of greenhouse gases in 2015. It is a resource-rich nation with enormous reserves of oil and gas, as well as considerable renewable energy potential.
- Water shortages, dust storms and air pollution are among the environmental issues facing the country with links to climate change.
- Iran is highly vulnerable to the effects of climate change. Average temperature rise compared to the pre-industrial baseline is already 1.8C, one and half times the mean global temperature rise.
- Iran's INDC lists cuts in agricultural production, dust storms, harm to biodiversity and "heat exhaustion and the spread of some diseases" among the dangers stoked by climate change.
- It also states that agriculture and the wider economy will face \$3.7bn in damages every year from 2015 to 2030 compared to 2010 "due to the changing trends of climate change and hydrological parameters".
- National parks of Iran are designated by Iran's environmental protection organization (DOE) as one of the four environmental protected areas of Iran.
- A national park is a range of the country's natural resources, including forests, pastures, natural groves, forest lands, plains, water, and mountains, which represent outstanding examples of Iran's natural manifestations, and in order to permanently preserve its natural and living conditions, as well as create an environment.



Fig. 1. An overview of biodiversity in national parks in Iran

## Methods

- We use ACCESS-CM2 model (Australian Community Climate and Earth System Simulator Coupled Model version 2) that is one of the advanced tools in the field of climate modeling and simulation of earth and atmosphere systems developed by the Australian Meteorological Organization and other related scientific institutions.
- By combining several components including the atmosphere, ocean, sea ice and biosphere, this model provides a more detailed and comprehensive analysis of the behavior of the Earth's climate system.
- ACCESS-CM2 uses the latest techniques and scientific data to simulate climate change at different time scales, from short to long time periods. This model is used in various studies such as weather forecasts, assessment of the effects of climate change on ecosystems, analysis of precipitation and temperature patterns, as well as investigation the atmospheric phenomena such as El Nino and La Nina fluctuations.
- The data produced by ACCESS-CM2 allows researchers to more accurately examine the potential impacts of climate change on the environment and human societies and use it to formulate adaptation and mitigation strategies.
- In this research we use Iran's metrological data to predict the future condition of temperature and precipitation.

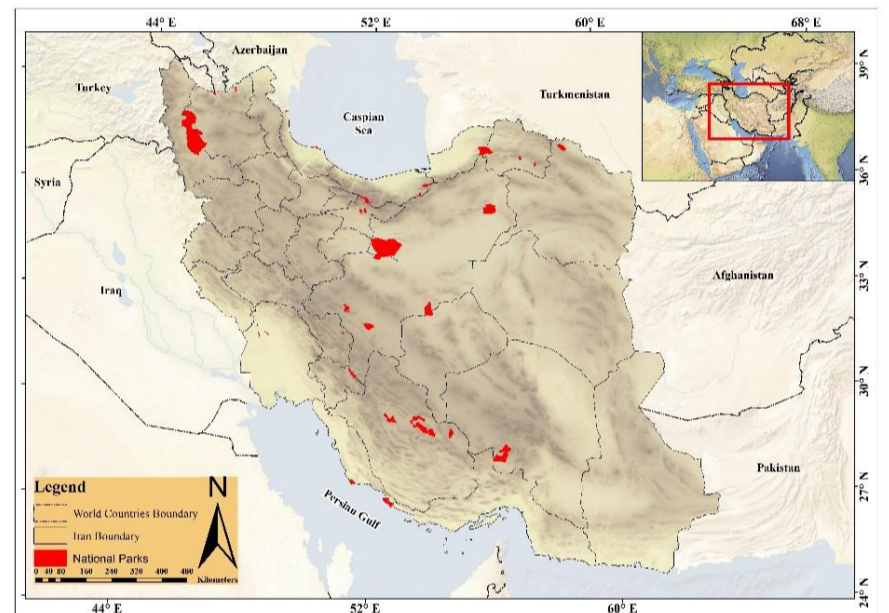


Fig. 2 .The location of national parks in Iran and the world

## Result and conclusions

- As can be seen in fig 3, the increase of maximum temperature occurs in the northwest of the country, and Urmia National Park will suffer the most, in this case. Regarding the increase of the minimum temperature, the southeast of the country will suffer the most and Bakhtegan National Park is the closest site to this region.
- It is also predicted that until 2040, the amount of precipitation will decrease in the northwest, central, and southeast parts of Iran and the most affected national parks are Arsbaran, Urmia, Kolah Ghazi, Mote, Siah Kouh, and Bakhtegan.
- Therefore, it is necessary to establish policies to mitigate the greenhouse gas emissions and adaptation with climate change in vulnerable areas.

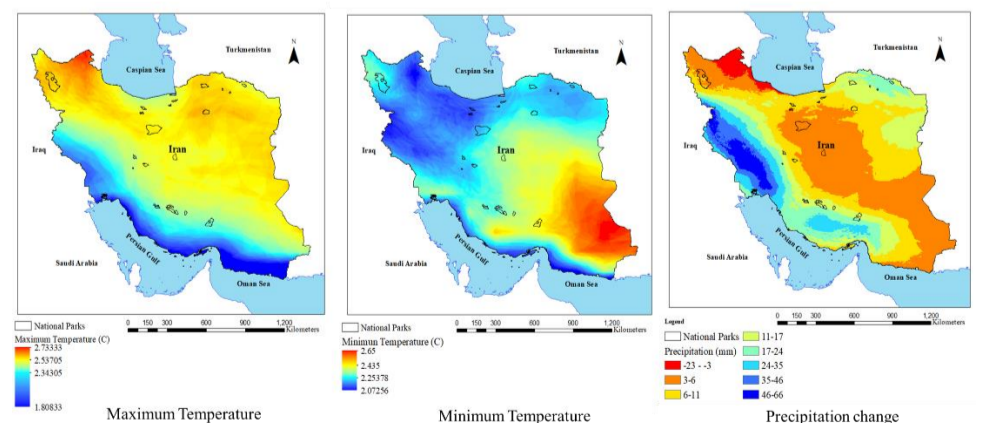


Fig. 3. Prediction of climate parameters change in 2040 comparing with 2023