# URBANIZATION AND CLIMATE CHANGE ADAPTATION

IN THE CASPIAN SEA REGION WITH FOCUS ON IRAN AND AZERBAIJAN

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# CLIMATE CHANGE AND URBAN DEVELOPMENT

Searching in literature and grasping a framework in order to facilitate the adaptation process of the settlements and the people who resides in the coastal area of Caspian sea

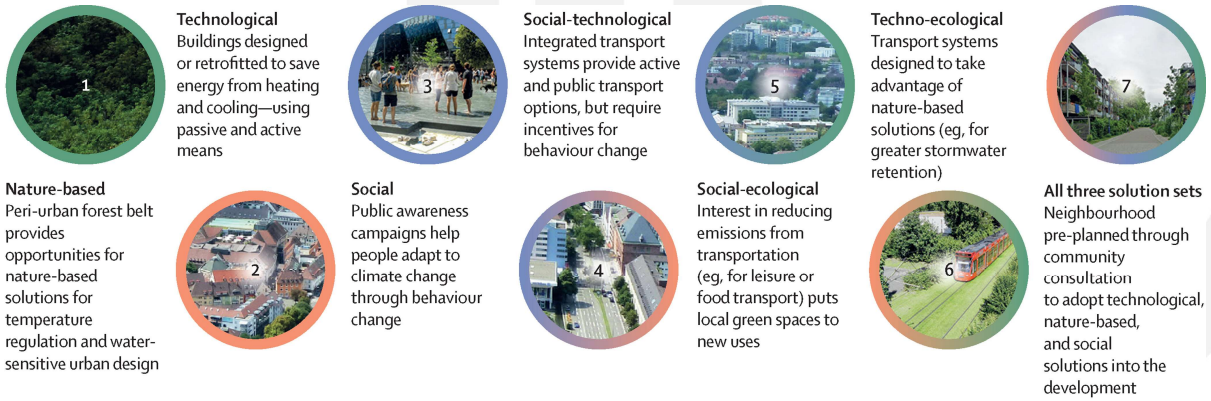
# CLIMATE CHANGE AND URBAN DEVELOPMENT

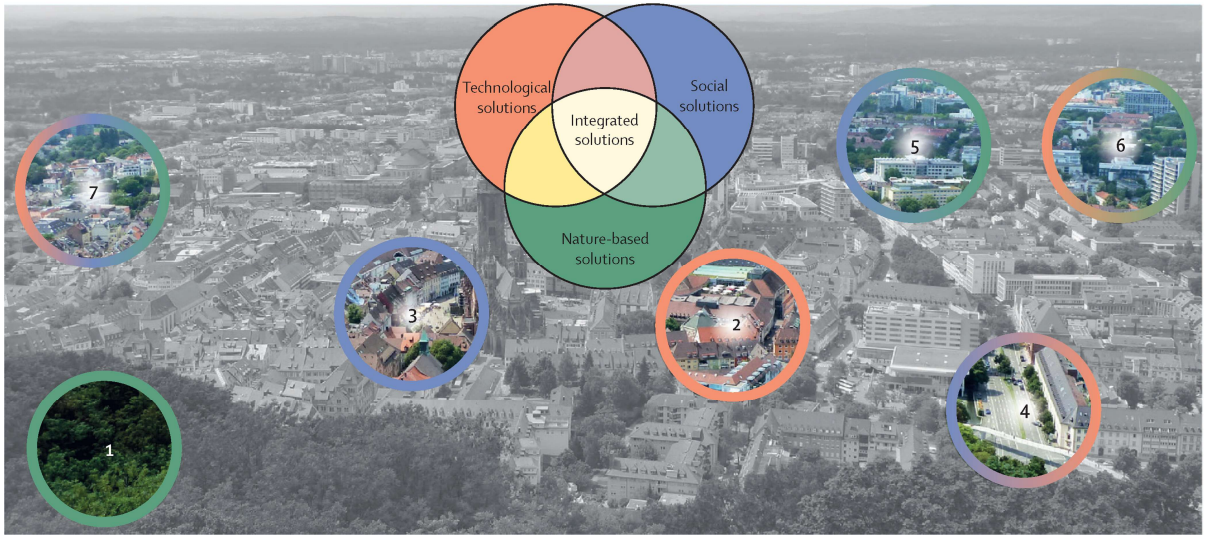
Record **climate extremes** are reducing urban **livability**, compounding **inequality**, and threatening **infrastructure**. Adaptation measures that integrate **technological**, **nature-based**, and **social solutions** can provide multiple co-benefits to address complex socioecological issues in cities while increasing **resilience** to potential impacts. However, there remain many challenges to developing and implementing integrated solutions.

Reference: Rough and Priestley. 2020
https://doi.org/10.1016/S2542-5196(21)00135-2

# Integrated Solutions to Adapt cities against climate change

Integrating diverse adaptation measures will be required to realize the transformations needed to build resilience to climate change and protect urban infrastructure and communities. This Viewpoint aims to spur a discussion on how to systematically integrate three types of solutions (ie, technological, nature-based, and social solutions), to strengthen urban climate resilience, and outline ways for overcoming the range of challenges that hamper integration.



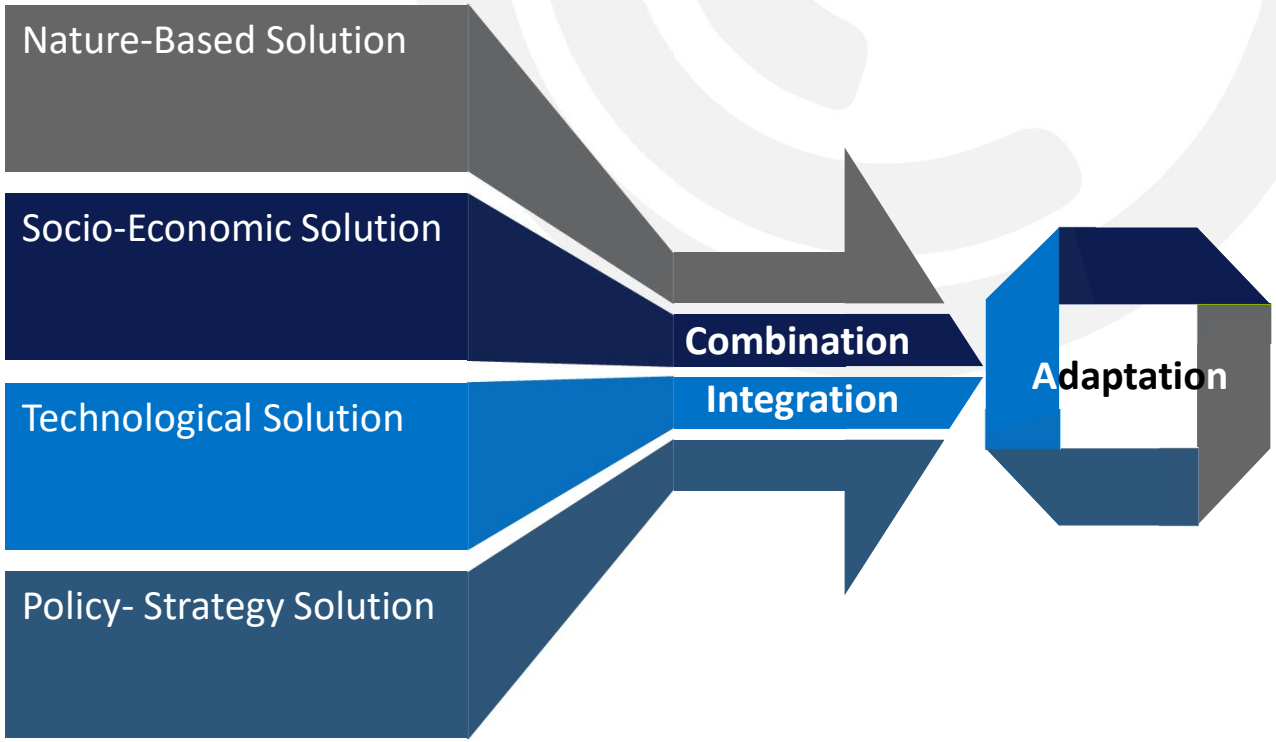




Reference: Brenda et. Al. 2021
https://doi.org/10.1016/S2542-5196(21)00135-2

# Proposed Framework for Climate Change Adaptation in Caspian Sea Region

Due to the specific context of this region, we should address the “policy-strategy solution” and emphasizing the “economic” solution as well. Therefore, we establish a framework to obtain adaptability of the urban area across the Caspian Sea region in Iran and Azerbaijan.

Of course, some of the solutions can be achieved through a cross-cutting view point to these different categories.



# INTRODUCING THE BACKGROUND PROJECT

The multilateral implementing entity for the program "Urbanization and Climate Change Adaptation in the Caspian Sea Region" is UN-Habitat (lead); UNEP (co-leading implementing partner); and IOM (implementing partner) and is supported by the Adaptation Fund.

01
Title of Programme
Urbanization and Climate Change Adaptation in the Caspian Sea Region.
02
Countries
Republic of Azerbaijan and Islamic Republic of Iran.
03
Type of Implementing Entity
Multilateral Implementing Entity (MIE).
04
Project Duration
4 Years.
05
Executing Entities
Government of Azerbaijan, Governme
of Islamic Republic of Iran
Regional Component:
Teheran Convention
Interim Secretariat
06
Amount of Financing Requested
14 Million U.S Dollars

# IDENTIFICATION OF CLIMATIC HAZARDS IN CASPIAN SEA REGION

This section discusses the different kinds of climatic hazards that threaten the Caspian Sea Region.

# HAZARDS

## SEA LEVEL FLUCTUATIONS

*Fluctuations of the Caspian Sea level 1900–2017 (source: Teheran Convention (2019), Caspian Sea – State of Environment)*

## WATER TEMPERATURE AND AIR TEMPERATURE RISE

In the Caspian Sea, increases in the **water temperature** and **air temperature** over the water are of great importance.

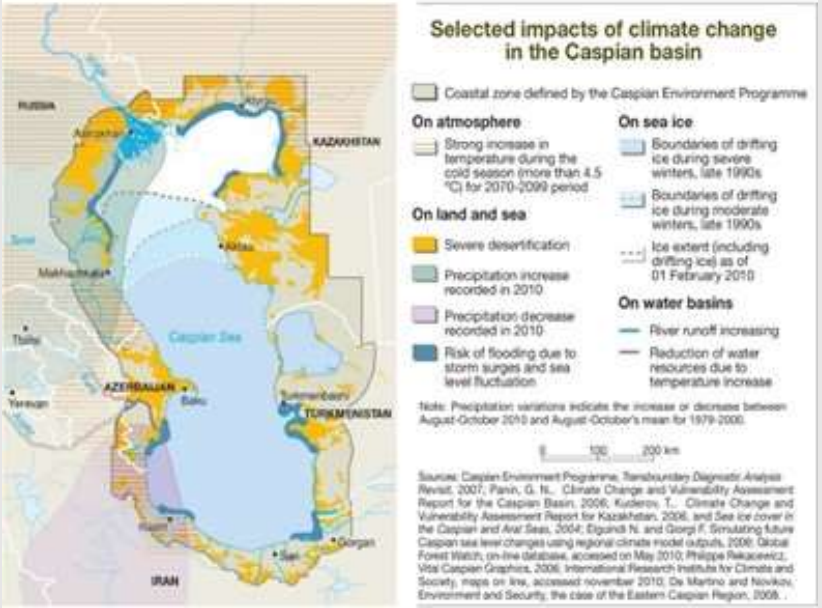
In the last quarter of the twentieth century, the Caspian Sea has been impacted by global warming, with the air temperature over the water increasing by 0.7–0.8°C and the surface water layer by 0.4 -0.5°C (CASPCOM 2017).

# HAZARDS

## FLOOD

In August 2001, after **heavy rainfall**, flash flooding occurred in the Mother-Soo catchment of Golestan when the Islamic Republic of Iran claimed over **300 lives**. In 2003, economic loss triggered by floods amounted to **65 million US$** at Kura river mouth in the Republic of Azerbaijan (Imanov et al, 2009). In 2010, over **70,000** people were affected by a flood and tens of thousands of homes were destroyed near the confluence of the Kura and Aras rivers (Safaraliyev 2015).

## INCREASED EXTREME WEATHER EVENTS




*Selected impacts of climate change in the Caspian Sea (source: Teheran Convention (2019), Caspian Sea – State of Environment)*

## DROUGHT

it is expected that climate change-related droughts will likely reduce water supply **by 23% during the next 3 decades** in the Republic of Azerbaijan. The increasing temperature will also cause water losses through **evaporation** and water shortages for the agriculture sector. While seasonal and annual precipitation variation in the Islamic Republic of Iran during 1975 - 2010 has not been significant, however, there has been an increase in the amount of **Consecutive Dry Days** (CDD) that resulted in water shortage at national scale.

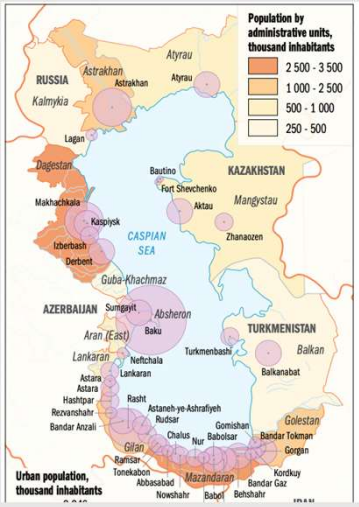
# SITUATION ANALYSIS

## BIODIVERSITY

Higher temperatures have contributed to **eutrophication**, which cuts oxygen levels needed by other **organisms**. In addition, a trend towards **warmer winters** seems to be reducing the seasonal ice cover that forms in the northern section, prime breeding habitat for the endemic Caspian seal.

There are four **National Parks** in the Republic of Azerbaijan and In the Islamic Republic of Iran, several have been registered under the Ramsar **protected areas c**onvention on Wetlands

## URBANIZATION



# SITUATION ANALYSIS

## POLLUTION

There are various sources of pollutants to the Caspian Sea from, including **river run-off, precipitation, sewage, discharge from ships and oil and gas facilities, and gas and liquid releases** from the seabed (the latter is not being addressed by the programme as only indirectly affecting urbanization dynamics in the wider region).

Wastewater discharge is mainly concentrated on the **western and southern coasts**, where there are large urban settlements and well-developed industrial and agricultural sectors.

## ECONOMY

The **agricultural production** in the Republic of Azerbaijan has been affected by those extreme weather events, a sector that represent 5.3% of the **GDP** and **employs** over 40% of the population (UNFCCC 2010).

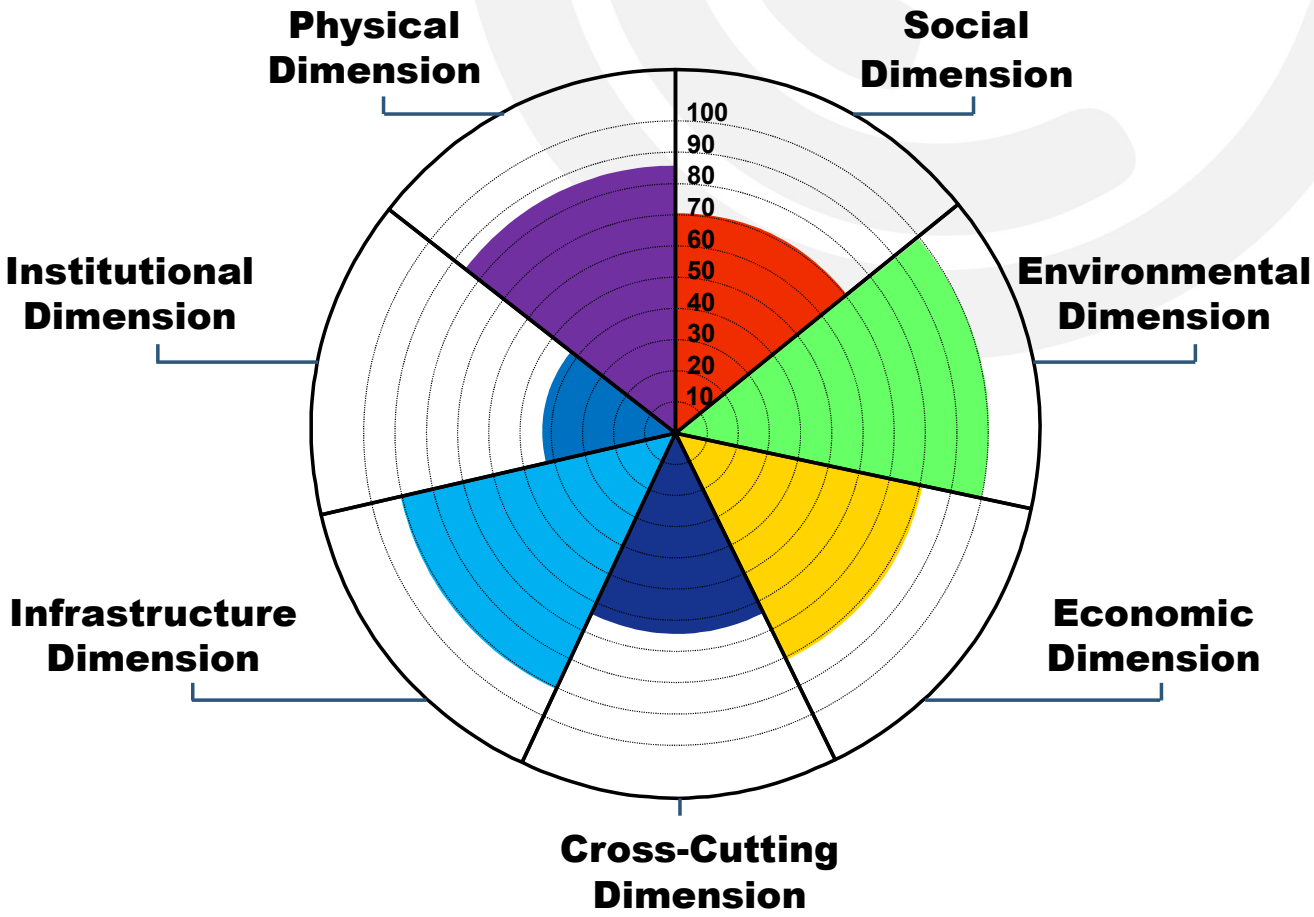
In Iran, the **agriculture sector** accounts for about 18% of the GDP and more than 20% of population employment. Moreover, climate change impact will also pose challenges to economic development linked to **tourism and recreational activities**

# IDENTIFICATION OF VULNERABILITIES IN THE COASTAL AREA OF IRAN AND AZERBAIJAN

This section discusses the different kinds of vulnerabilities which are exist in the Caspian Sea Region.

# VULNERABILITY CRITERIA

The IPCC Fifth Assessment Report (AR5) Working Group II defines vulnerability as “the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.” Moreover, the IPCC AR5 WGII defines contextual vulnerability (starting-point vulnerability) as “a present inability to cope with external pressures or changes, such as changing climate conditions. The IPCC AR5 WGII defines outcome vulnerability (end-point vulnerability) as “vulnerability as the end point of a sequence of analyses beginning with projections of future emission trends, moving on to the development of climate scenarios, and concluding with biophysical impact studies and the identification of adaptive options. (Kelly and Adger 2000; O’Brien et al. 2007).



# VULNERABILITY CRITERIA

## Physical Dimension

**Land use**
Agricultural, forest, urban sprawl, etc.

**Building**
Structure, energy consumption, etc.

## Social Dimension

**Demographic**
Age, gender, disability, migration, female headed household, etc.

**Social**
Literacy, household size, human right, etc.

## Environmental Dimension

**Extreme weather events**
Flood, drought, biodiversity loss, etc.

**Natural resources**
Soil, water, air, vegetation, wildlife, etc.

## Vulnerability to Climate Change

## Institutional Dimension

**Participation**
Awareness, preparedness, etc.

**Governance**
Capacity, warning system, legislation, etc.

## Infrastructure Dimension

**Green Infrastructure**
Water, energy, etc.

**Mobility**
Walkability, transit, etc.

## Economic Dimension

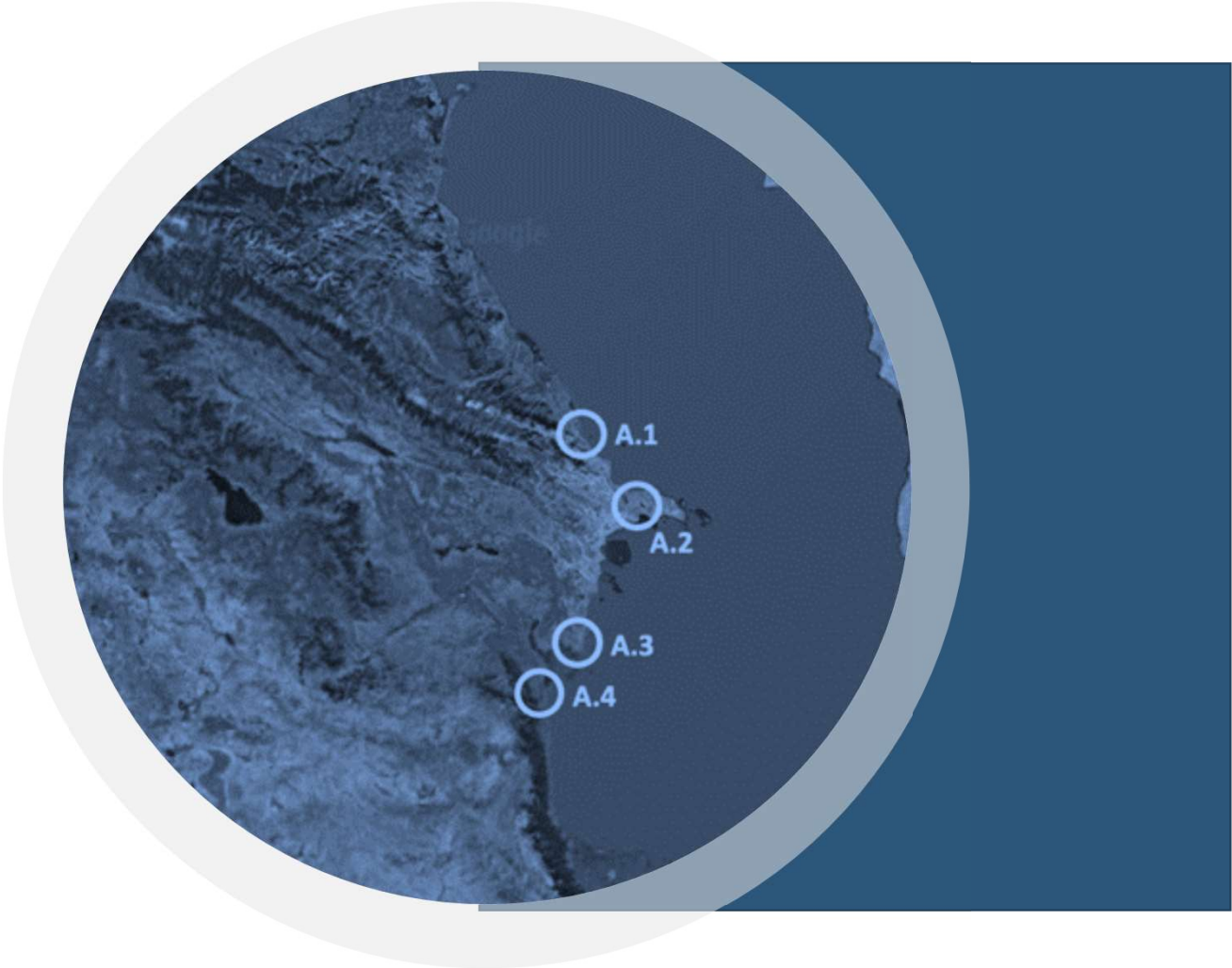
**Household features**
Employment, income, livelihood, etc.

**GDP**

# SELECTION OF MOST VULNERABLE TARGET AREAS, AZERBAIJAN

Four target areas were selected as the most vulnerable communities that the project aims to cover in the Republic of Azerbaijan:

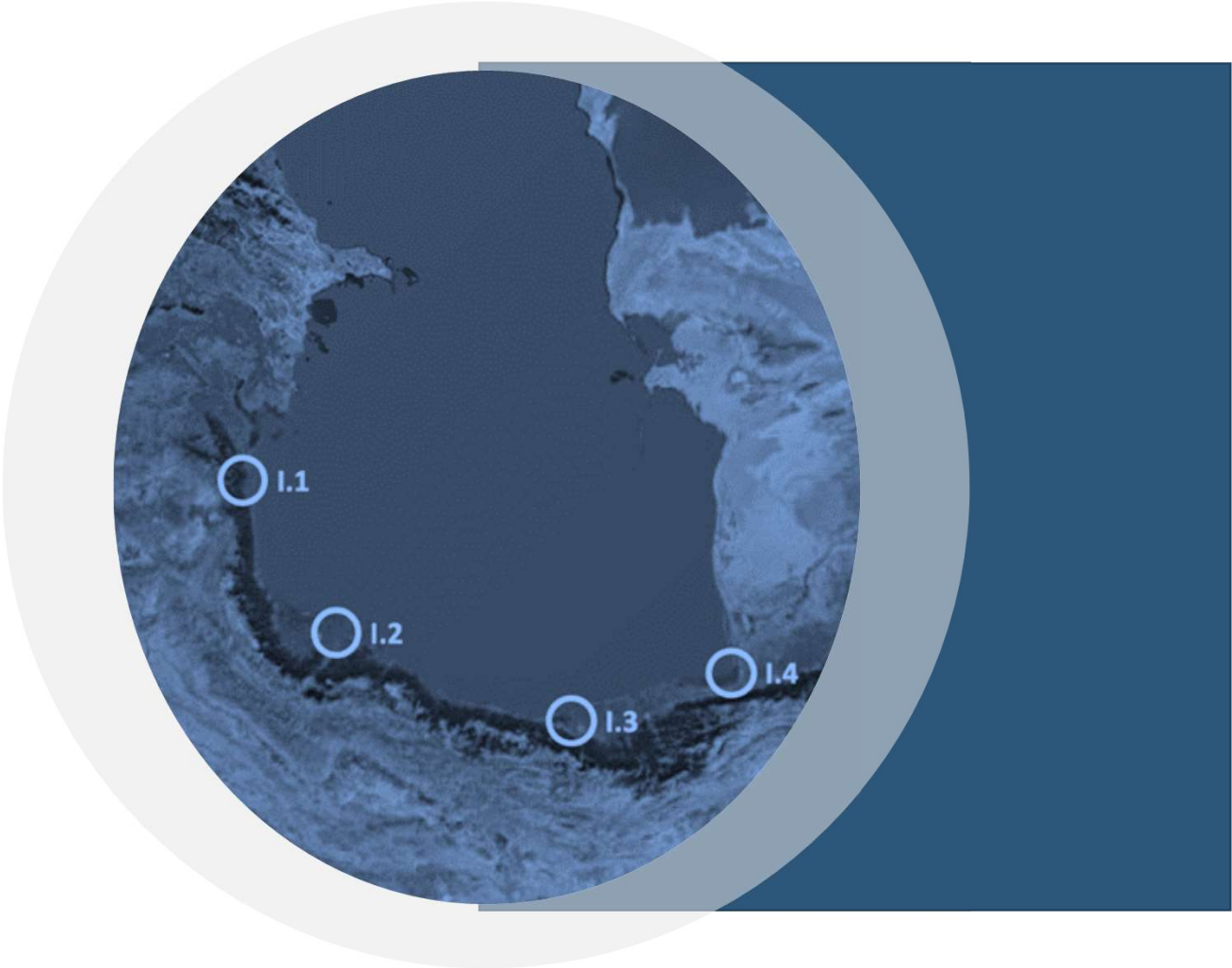
- (A.1) Siyazan Region;
- (A.2) Greater Baku Region, Pirallahi Island;
- (A.3) Neftchala Region; and
- (A.4) Lankaran/ Astara Region



# SELECTION OF MOST VULNERABLE TARGET AREAS, IRAN

Four target areas were selected as the most vulnerable communities that the project aims to cover in the Islamic Republic of Iran:

- (I.1) Astara Region, Astara City;
- (I.2) Anzali Lagoon and Sefidroud Delta, Bandar Kiashahr;
- (I.3) Haraz River Estuary, Mahmoud Abad; and
- (I.4) Gorgan Bay/ Miankale Lagoon, Bandar Torkaman



# ADAPTATION MEASURES

This section demonstrates the proposed set of measures were chosen to enhance the adaptation capacities of the communities and the people in the Caspian Sea Region.

# PROPOSED MEASURES

## POLICY/ STRATEGY DIMENSION

1.1. Knowledge and awareness raising on cross-sectoral climate change adaptation

1.2. Integrated Coastal Zone Management Approach, including prioritization of concrete climate change adaptation measures

1.3. Involvement of municipalities and communities into decision-making process

1.4. Incorporation of climate change problems into Master Plans or other Strategic Documents

1.5. Harmonization of Climate Change Adaptations with other strategic documents including Agriculture Policy, Water Management Policy, Regional Development Program

1.6. Integrated regional/ city and neighborhood Solid Waste Management Scheme, and piloting of concrete intervention (establishing waste polygon or organizing waste collection to processing plant)

1.7. Integrated regional/ city and neighborhood (off the grid) sewage management system, and piloting of concrete intervention

1.8. Integrated regional/ city and neighborhood water resource management system, and piloting of concrete intervention

1.9. Decreasing the adverse effects of urban heat Islands in public spaces, and piloting of concrete intervention

1.10. Integrated regional/city, and neighborhood Low-Carbon transportation development

## INFRASTRUCTURE MEASURES

# PROPOSED MEASURES

## BIODIVERSITY DIMENSION

1.11. Biodiversity protection program

1.12. Restoration of forests through the cultivation of more drought-resistant tree species in the forest ecosystem taking into account the domestic species

1.13. Protection of the ecological corridors within Protected Natural Areas and provision of other relevant measures to protect biodiversity, while undertaking economical activities when it is allowed, e.g. in the national park

1.14. Restoration of natural ecosystems to reduce coastal flooding, coastal erosion and reduce habitat loss.

1.15. Making space for nature – removal of hard man-made riverbanks and blue ways as well as greenways through urban areas

## LIVELIHOODS DIMENSION

1.16. Strengthen climate-resilient income-generating abilities

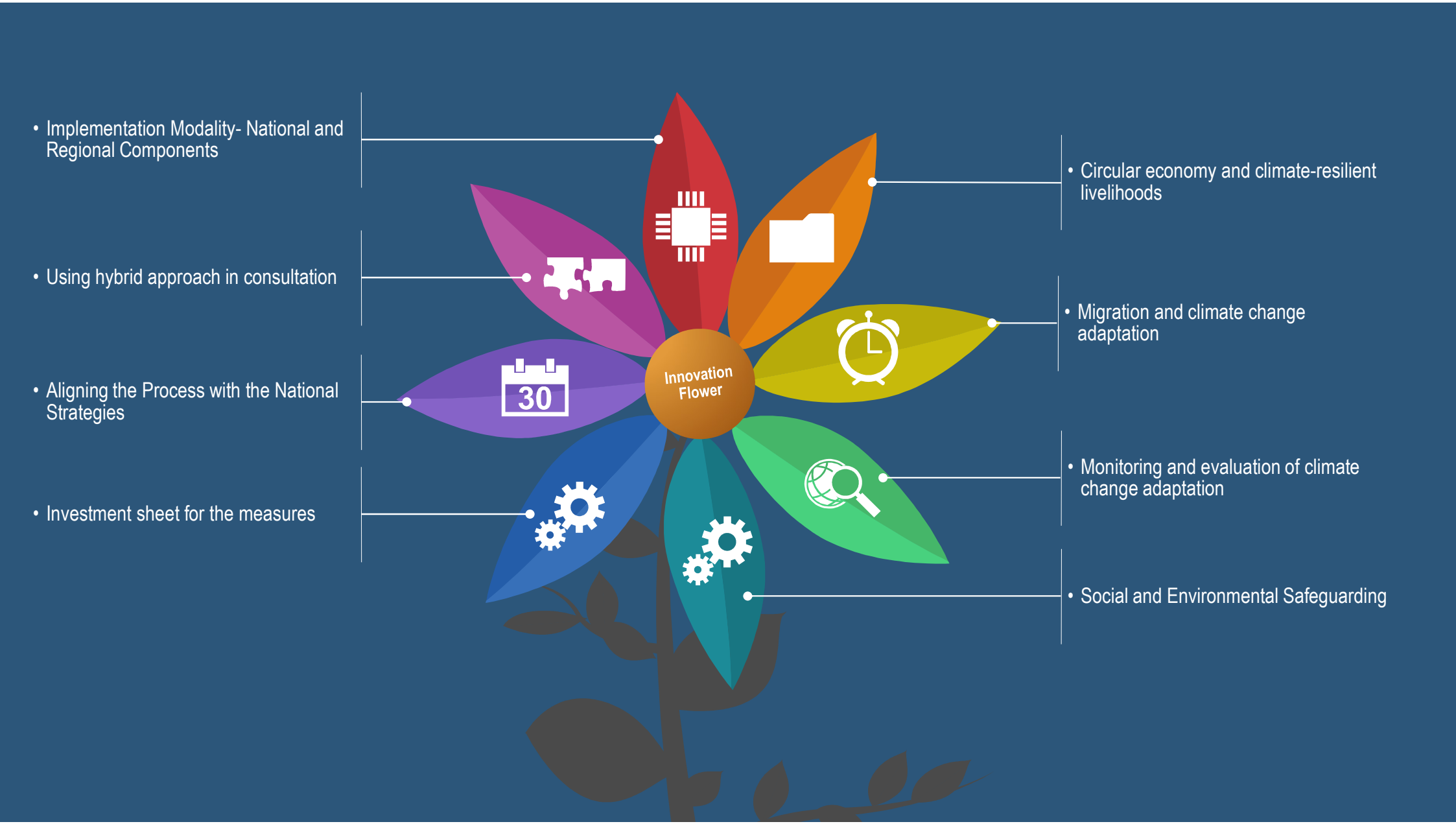
1.17. Create climate-resilient employment opportunities for female-headed families

1.18. Create climate-resilient income generating opportunities for urban migrants

1.19. Assistance to fishery communities

# INNOVATION AND KNOWLEDGE PRODUCTION

This section discusses the knowledge and innovation which have been employed to enhance the adaptation capacities of the communities and the people in the Caspian Sea Region.


Implementation Modality- National and Regional Components
Using hybrid approach in consultation
Aligning the Process with the National Strategies
Investment sheet for the measures
Innovation Flower
30
Circular economy and climate-resilient livelihoods
Migration and climate change adaptation
Monitoring and evaluation of climate change adaptation
Social and Environmental Safeguarding

# Summary

The project aimed at tackling the impacts of the main identified hazards: (i) sea level fluctuation and potential decrease; (ii) increased floods; (iii) more intense droughts; and (iv) desertification in the Caspian Sea coasts, particularly in the Republic of Azerbaijan and the Islamic Republic of Iran. The proposed adaptation measures for the four main hazards have been considered in relation to urbanization processes and through the integrated approach to spatial and coastal planning, innovation, knowledge sharing, access to resources and management capacity.

# THANK YOU!

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