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CLIMATE CHANGE ADAPTATION AND IMPLEMENTATION PLAN

SOUTHEASTERN ANATOLIA REGION OF TÜRKİYE

PRESENTATION 2025

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More Information
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CLIMATIC CHALLENGES IN SOUTHEASTERN ANATOLIA

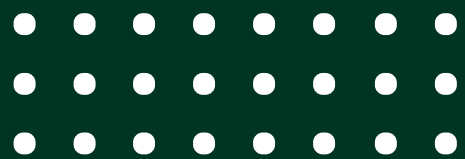
- Rising temperatures above the global average
- Irregular precipitation regimes
- Prolonged droughts, sudden flood events
- Agriculture
- Water resources
- Public health
- Infrastructural threats





HYDRO-CLIMATIC RISKS: DROUGHT AND FLOODS/FLASH FLOODS

- Droughts threaten food security and drinking water sources.
- Sudden flood events occur due to heavy rainfall.
- Increasing pressure on dams, rivers, and storm water infrastructure





URBAN FLOODS AND THE URBAN HEAT ISLAND EFFECT



- In the major cities of Southeastern Anatolia, urban floods caused by sudden and intense rainfall have become more frequent with climate change.
- Intensive urbanization and decreasing vegetation cover are exacerbating the urban heat island effect, further increasing city temperatures during the summer months.
- These two issues are making urban life more difficult by damaging infrastructure and affecting public health.
- Strengthening urban drainage infrastructure and increasing stormwater discharge capacity (such as installing large-diameter sewer lines, pump stations, and water retention basins).
- Expanding green infrastructure to mitigate flood risk: creating parks, green areas, rain gardens, and permeable surfaces to allow rainwater absorption.
- To reduce the urban heat island effect: increasing afforestation, promoting green roofs and vertical gardens.
- Using light-colored or reflective materials on surfaces such as building roofs and roads.
- Establishing early warning systems for flood events and heatwaves, and preparing emergency action plans.



URBAN INFRASTRUCTURE PROBLEMS

- In Southeastern Anatolia, the existing infrastructure of rapidly growing cities is struggling to cope with the new burdens brought by climate change.
- Extreme weather events (e.g., floods, storms, heatwaves) can cause damage or disruptions in aging roads, bridges, water, and energy networks.
- It is critically important to make infrastructure resilient to climate conditions and to be prepared for future risks.
- Urban planning and construction standards should be updated to take climate risks (floods, extreme heat, etc.) into account.
- Existing infrastructure (roads, bridges, water, and sewage systems) should be reinforced and renewed to withstand climate conditions.
- Critical facilities (hospitals, water treatment plants, energy infrastructure) should be equipped with backup systems and protective measures (e.g., generators, flood barriers).
- The use of smart city technologies (e.g., flood sensors, smart water and electricity meters) should enable real-time monitoring of infrastructure performance.
- Green infrastructure and energy-efficient designs should be promoted in new urban developments.





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STRUCTURAL ADAPTATION AND IMPLEMENTATION ACTIONS

Increasing the capacity and expansion of stormwater drainage systems

→Expansion of main and secondary stormwater lines to include newly developing neighborhoods.

Construction of pumping stations in low-lying areas

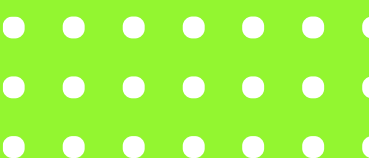
→Installation of underground water retention tanks beneath parking lots and park areas.

Widespread implementation of permeable surfaces

→Mandatory use of permeable materials in sidewalks, squares, and parking lots.

Strengthening stormwater management through green infrastructure

→Integration of green infrastructure elements such as bioswales, rain gardens, and tree trenches into urban planning.





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ADAPTATION AND IMPLEMENTATION ACTIONS FOR SUSTAINABLE ENERGY SYSTEMS

Restoring the natural functions of urban stream beds

→ Stabilizing stream banks with vegetative buffer zones instead of concrete embankments.

Elevating critical infrastructure and supporting them with backup systems

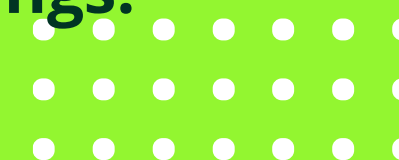
→ Raising roads, hospitals, and energy infrastructure in areas with high flood risk.

Construction of flood barriers and diversion channels

→ Installing smart gates and backflow prevention valves at drainage outlets.

Installation of rainwater harvesting systems at the building level

→ Implementing rainwater collection systems in public buildings.





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NON-STRUCTURAL (POLICY AND COMMUNITY-BASED) ADAPTATION ACTIONS

Preparation of urban flood risk maps and their integration into zoning plans

→ Limiting or removing construction in stream beds.

Development of flood early warning systems

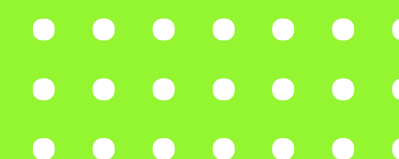
→ Integration of real-time rainfall and water level monitoring systems into municipal operations.

Preparation of neighborhood-based evacuation plans

→ Designation of evacuation routes and shelters specific to each neighborhood.

Promotion of flood insurance

→ Subsidized insurance programs for households and businesses located in high-risk areas





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Conducting community-based awareness and education activities.

→ Preparation of culturally compatible educational programs with materials in Turkish.

Ensuring regular maintenance of urban drainage systems.

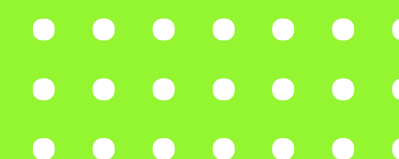
→ Establishing annual maintenance schedules for municipalities for manhole cleaning and canal inspections before the rainy season.

Integration of flood data into urban planning.

→ Use of hydraulic modeling in spatial planning and inclusion in licensing processes.

Establishment of institutional coordination mechanisms.

→ Creation of coordination desks with defined roles among AFAD, DSI, municipalities, and Meteorology.





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WATER SCARCITY AND DROUGHT MANAGEMENT

ADAPTATION AND IMPLEMENTATION

ACTIONS

Agricultural irrigation systems should be modernized with water-saving technologies.

→ Grants and technical support should be provided to farmers to promote drip and sprinkler systems; irrigation cooperatives should be institutionalized.

Rainwater harvesting systems should be integrated into rural and urban areas.

→ Cistern systems to collect rainwater from roofs should be established in villages; in cities, micro storage tanks should be installed in parks, schools, and public buildings.

Leakage rates in municipal water networks should be reduced.

→ Water leaks should be detected and repaired through smart meter systems, infrastructure renewal projects, and network monitoring teams.

Drought management plans should be developed and implemented at the local level.

→ Drought plans with defined threshold values and inter-sectoral water-sharing priorities should be prepared by provincial special administrations, DSI, and municipalities.

Groundwater resources should be monitored and limited for sustainable use.

→ Flow meters should be installed on boreholes, unlicensed wells should be registered, and penal sanctions should be applied for controlled water extraction.



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Natural resources should be protected and afforestation carried out in critical water basins.

→ Afforestation and soil-water conservation projects with drought-resistant native species should be implemented in the lower basins of the Euphrates and Tigris rivers.

Greywater recovery and reuse systems in industry and agriculture should be promoted.

→ Infrastructure incentives should be provided for the reuse of treated water in food industry facilities, and the use of wastewater in agricultural irrigation should be standardized.

Water pricing policies should be updated to encourage conservation.

→ Water consumption should be limited with increasing block tariffs; social tariffs should be applied for low-income groups while pricing models that encourage waste should be eliminated.

Region-specific education and awareness programs to improve water literacy should be initiated.

→ Awareness activities should be conducted in village schools, religious vocational schools (imam hatips), and village meetings with educational materials prepared in Turkish, Kurdish, and Arabic.

Seasonal drought forecasts and water supply projections should be regularly published.

→ Early warnings should be provided through bulletins, mobile applications, and radio announcements directed at local producer unions and municipalities, in collaboration with Meteorology and DSI.

SUSTAINABLE AGRICULTURE



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- Agriculture holds a fundamental place in the economy of the Southeastern Anatolia Region; however, climate change—manifested by rising temperatures, irregular precipitation patterns, and frequent droughts—poses significant threats to agricultural production.
- Yield losses and challenges in livestock farming jeopardize regional food security and the livelihoods of farmers.
- Therefore, transitioning to more resilient and sustainable agricultural practices is of vital importance.
- Development and adoption of drought-resistant seed varieties and crop types by farmers.
- Expansion of modern, water-efficient irrigation techniques such as drip and sprinkler irrigation.
- Promotion of climate-smart agricultural practices that protect soil and enhance water retention, including crop rotation, residue retention, and mulching.
- Broadening the scope of agricultural insurance to shield farmers from climate risks and establishing support mechanisms for drought impacts.
- Ensuring production diversification through varied cropping patterns and agroforestry, alongside fostering alternative income sources such as beekeeping and eco-tourism.



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ADAPTATION AND IMPLEMENTATION ACTIONS

Drought-resistant crop varieties should be developed and introduced to farmers through hands-on applications.

→ Through field schools and agricultural advisory programs, the cultivation of low-water-demand crops such as sorghum, millet, and chickpeas should be promoted.

Climate-friendly agricultural practices that conserve soil moisture and enhance productivity should be encouraged.

→ Farmers should be trained in preventing stubble burning, applying mulching techniques, practicing crop rotation, and adopting reduced tillage methods.

Irrigation management and agricultural insurance systems should be expanded to increase resilience against risks.

→ Inclusion of farmers in the agricultural insurance program (TARSIM) should be facilitated, and equitable representation should be ensured within irrigation cooperatives.

Livestock and pasture systems should be aligned with cyclical grazing, shaded areas, and sustainable water points.

→ Mobile shade structures, solar-powered water pumps, and pasture management plans optimizing grazing routes should be developed



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Production processes should be made more efficient through digital agricultural technologies.

→ Smart irrigation systems, satellite imagery-based early warning applications, and mobile field assistants should be widely adopted.

Agrobiodiversity must be preserved, and local seed systems strengthened.

→ Local seed banks should be established, and traditional seed-saving knowledge should be transferred from elder farmers to younger generations.

Special support programs should be developed for women and young farmers.

→ Microcredit opportunities, technical training programs, and rural entrepreneurship incubators should be established for women and young entrepreneurs.

Energy efficiency and renewable energy applications in agriculture should be promoted.

→ Solar-powered irrigation systems, biogas-operated small ruminant shelters, and investments in energy-efficient equipment should be expanded.

Climate-focused farmer organization and regional knowledge-sharing networks should be supported.

→ Through local producer unions and chambers of agriculture, regional climate risk maps, early warnings, and agricultural decision support systems should be delivered to farmers.



ACTIONS

Investments in solar and wind energy should be rapidly increased.

→ Solar panels and wind turbines should be installed in organized industrial zones, rural settlements, and public buildings through public-private partnerships.

Hybrid hydro-solar systems should be installed at dam sites.

→ Floating solar panels should be placed on the surfaces of large dams like Atatürk and Keban to reduce water evaporation while diversifying energy production.

Energy efficiency programs should be initiated in buildings and industry.

→ Grant-supported payback programs should be implemented for home insulation, LED lighting, and high-efficiency motor and boiler conversions.

Energy infrastructure should be strengthened against climate impacts.

→ Transformer insulation should be enhanced against extreme heat and storms, power lines should be buried underground, and backup energy systems should be established in critical areas.

Community-based solar energy cooperatives should be supported.

→ Technical and financial guidance should be provided for low-income households in villages and small districts to jointly establish mini solar energy systems





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Passive building design and thermal insulation should be integrated into urban planning.

→ In new constructions, orientation, natural ventilation, reflective roofing materials, and high-performance window systems should be made mandatory.

Energy demand should be reduced through climate-sensitive urban design.

→ Shaded pedestrian pathways, permeable surfaces, and cooling vegetation in open spaces should be increased in city centers.

Energy consumption audits should be conducted in industrial zones, and transitions supported.

→ Energy use should be monitored in organized industrial zones (OSBs), and low-interest green transition loans should be provided to SMEs with inefficient production processes.

Microgrids based on renewable energy sources should be established.

→ Solar and battery-based microgrid systems should be piloted in rural neighborhoods to mitigate power outages.

Social support programs should be developed to combat energy poverty.

→ Energy-efficient appliance support, energy use consultancy, and consumption monitoring applications should be implemented for low-income households.



ACTIONS

Early warning systems for extreme heat should be established and local action plans developed.

→ A "heatwave alarm system" integrated with meteorological data should be set up; municipalities should designate cooling centers, and automated SMS alert systems should be activated during extreme heat events.

Drinking water safety plans should be prepared and made ready for emergencies.

→ All municipal water authorities should develop plans including water test kits for sudden contamination, mobile treatment units, and alternative distribution routes.

Disease surveillance systems should be strengthened and integrated with climate data.

→ Digital warning software based on regional temperature-humidity models should be developed for climate-sensitive diseases such as malaria, diarrhea, and West Nile virus.

Health infrastructure should be made resilient to climate disasters.

→ Hospitals should be equipped with generator systems, flood barriers, backup air conditioning; critical devices should be relocated to upper floors, and evacuation plans updated.

Community-based health awareness campaigns should be expanded.

→ Local radio, social media, and mosque announcements in Turkish, Kurdish, and Arabic should be used to raise awareness about heatwaves, hygiene, and protection against insect bites.





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Mobile health teams capable of responding after climate events should be established.

→ Mobile units staffed with both doctors and psychologists, connected to 112 emergency centers, should be deployed to disaster areas and provide intervention within the first 72 hours.

Healthcare workers should be trained on climate-related diseases.

→ Training on heat stroke diagnosis, vector monitoring, and climate trauma should be provided to family physicians and primary healthcare staff.

Climate and health topics should be integrated into the school curriculum.

→ The impacts of climate on health, hygiene habits, and basic first aid should be incorporated into science and social studies courses.

Special protection measures should be taken for vulnerable groups.

→ Home visit programs and support hotlines should be established for chronic patients, the elderly, individuals living alone, and pregnant women during heat waves.

Data sharing and institutional coordination within the health system should be strengthened.

→ A synchronized digital “climate-health information network” connecting public health directorates, meteorology, AFAD, and WHO should be established.

URBAN INFRASTRUCTURE AND RESILIENT CITIES



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ADAPTATION AND IMPLEMENTATION



ACTIONS

Urban drainage systems should be expanded and upgraded to align with climate change adaptation.

→ In metropolitan areas such as Diyarbakır, Şanlıurfa, and Gaziantep, stormwater drainage capacity should be increased in high flood-risk zones; maintenance frequency to prevent blockages should be raised, and climate projections must be incorporated into new underpass projects.

Green infrastructure applications should be increased and integrated into urban sprawl strategies.

→ City parks, bioswales, permeable pavements, and greenways should be included as mandatory elements in new zoning and development plans.

Alternative urban water sources should be developed to ensure water supply security.

→ Treated wastewater reuse facilities should be established; groundwater levels monitored with pilot projects launched in selected areas; and greywater systems should become mandatory in new public buildings.

Zoning and building regulations should be made climate risk-sensitive.

→ Regulations should mandate rainwater harvesting systems on roofs, insulation materials resistant to high temperatures, and minimum height requirements in new buildings.

Disaster evacuation and emergency response plans should be updated and regularly tested through drills.

→ In districts prone to floods and heatwaves, public transportation evacuation routes, disaster assembly areas, and neighborhood volunteer teams should be designated and regularly practiced.





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Urban heat island effect should be mitigated through climate-sensitive urban planning.

→ In new development areas, reflective roofing materials, tree corridors providing shade, east-west oriented street layouts, and designs that support natural airflow in open spaces should be made mandatory. This directly contributes to reducing urban temperatures and improving quality of life.

Smart city technologies should be used for rapid response to climate events.

→ Smart infrastructures such as flood sensors, real-time energy consumption panels, temperature maps, and early warning systems for water inundation should be integrated into local government operation centers to enable real-time data monitoring and quick response.

Community participation should be increased by implementing neighborhood-scale climate resilience programs.

→ Climate action groups should be established at the neighborhood level, green space projects should be designed with local community involvement, and regular neighborhood forums should discuss climate change agendas and solutions. This strengthens local ownership and solidarity.

Use of heat-resistant roofing and pavement materials should be expanded.

→ In new public buildings and asphalt surfaces, light-colored, solar-reflective coating materials should be mandatory, and phased transformation programs should be initiated for existing infrastructure. These applications reduce heat absorption in the city.

Urban micro green spaces and cooling corridors should be designed.

→ Tree-lined walking paths, mini parks, and vertical gardens should be established especially in neighborhoods with high populations of children, elderly, and low-income groups to reduce heat stress while ensuring social equity.

BIODIVERSITY AND ECOSYSTEMS



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ADAPTATION AND IMPLEMENTATION



ACTIONS

Habitat Protection and Restoration

→ Critical natural habitats such as wetlands, forests, and grasslands must be identified, legally protected, and restored where degraded. Restoration projects should use native species to enhance ecosystem resilience against climate change.

Conservation of Endemic and Threatened Species

→ Targeted programs should focus on monitoring, protecting, and breeding endemic and endangered species, integrating local communities in conservation efforts to ensure sustainable coexistence.

Promotion of Ecological Connectivity

→ Ecological corridors linking fragmented habitats should be established and maintained to allow species migration and genetic flow, especially under shifting climate zones.

Sustainable Land Use and Agriculture

→ Agroecological practices that support biodiversity — such as intercropping, agroforestry, and organic farming — must be incentivized to reduce habitat loss and pesticide impacts.

Invasive Species Management

→ Early detection, control, and public awareness campaigns on invasive species should be prioritized to protect native ecosystems and maintain ecological balance.

Community Engagement and Traditional Knowledge

→ Indigenous and local community knowledge on biodiversity should be documented and integrated into ecosystem management plans, fostering stewardship and sustainable use.

Biodiversity Monitoring and Data Sharing

→ Establish regional biodiversity monitoring networks using remote sensing and citizen science, with open-access databases to inform policy and public awareness.





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Environmental education programs on the importance of ecosystem services should be expanded.

→ Environmental awareness campaigns should be conducted in schools and village centers; activities such as nature walks, bird watching, and local guide training should be organized to raise awareness.

Nature-based tourism and sustainable product harvesting initiatives should be encouraged.

→ Pilot regions should be identified for activities such as ecotourism, aromatic plant cultivation, and honey production; local communities should be supported with training and marketing opportunities should be developed.

Species and habitat restoration projects adapted to climate change should be implemented.

→ Reforestation and pasture improvement projects should be carried out in degraded areas using native species that are drought- and heat-resistant.

Ecosystem-based adaptation plans should be integrated with national biodiversity strategies.

→ Regional biodiversity action plans should be prepared using current climate scenarios and ecological data and integrated into national strategic documents.

CRITICAL OTHER SECTORS FOR THE REGION



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(E.G., ENERGY, DISASTER



MANAGEMENT)

- Other important sectors affected by climate change include energy and disaster management.
- Rising temperatures increase electricity demand for cooling during summer months, and extreme weather events pose risks to energy transmission infrastructure, making the transition to a resilient and clean energy system essential for the region.
- Enhancing the climate resilience of energy infrastructure: strengthening power transmission lines and protecting transformer and distribution centers against extreme weather events.
- Investing in renewable energy sources (solar, wind) in the region to both reduce greenhouse gas emissions and ensure energy production independent of climate conditions.
- Promoting energy efficiency programs, especially in buildings and industry, to encourage energy savings (such as thermal insulation and the use of efficient devices).
- Establishing early warning systems for disasters and preparing updated emergency response plans in all municipalities.
- Strengthening coordination between local governments, AFAD (Disaster and Emergency Management Authority), and other relevant institutions, and ensuring preparedness through regular drills.



THANK YOU FOR YOUR ATTENTION

“Together, we can contribute to a sustainable future”

Questions & Discussion

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