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MICRO-CREDENTIAL

Climate Change of Sustainable Land Management in Central Asia

5.- Climate Extremes, Hazards and Risk

Aral Sea Region: A Case of Multi-Hazard Environmental Change

CC-W05-V18



A HUMAN-DRIVEN CRISIS UNDER CLIMATE AMPLIFICATION

- The dramatic contraction of the Aral Sea was driven primarily by diversion of the Amu Darya and Syr Darya for irrigation.
- Climate change did not create the original crisis, but it now acts as a risk multiplier through heat stress and higher evaporative demand.
- The basin therefore illustrates how climatic and human drivers operate combined rather than separately.
- For teaching purposes, it is a classic case of multi-hazard environmental change.



Figure 1. Shrinkage of the Aral Sea between 2000 and 2014.



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ENVIRONMENTAL CHANGE AS A MULTI-HAZARD SYSTEM

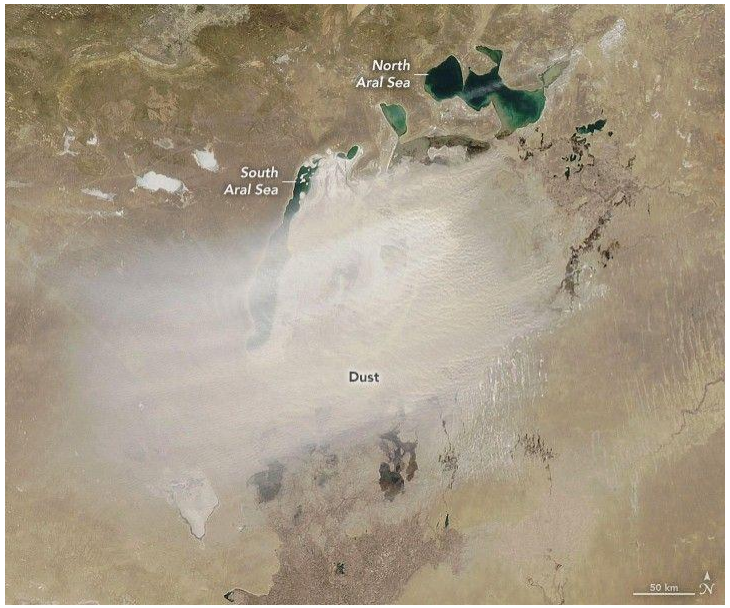
- As the sea contracted, the region experienced salinization, ecosystem loss, fishery collapse and exposure of contaminated sediments.
- The exposed seabed became the Aralkum, a new source of salt and dust aerosols.
- The crisis therefore expanded from water loss to a cascade of ecological, agricultural, atmospheric and public-health hazards.
- This is why the chapter analyses the region through interaction and feedbacks.



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THE ARALKUM: FROM WATER-SYSTEM FAILURE TO AIR-QUALITY RISK

- Salt and dust storms from the exposed seabed degrade air quality, damage crops and transport pollutants.
- These hazards persist long after the original diversion decisions were made.
- The Aralkum therefore shows how poor water governance can create long-duration atmospheric risk.
- The health burden is part of the environmental story, not a separate issue.



Satellite image of a dust storm over the Aral Sea region, with much of the dust coming from the Aralkum Desert. Source: NASA Earth Observatory, "A Dusty Day Over the Aral Sea".



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THE IMPORTANCE OF SCALE IN ASSESSING SOLUTIONS



Satellite comparison of the Aral Sea over time, showing partial northern recovery alongside broader basin decline. Source: NASA Earth Observatory, "Aral Sea, 2000–2008".

- Some local interventions, especially around the Small Aral, have produced measurable improvement.
- Yet basin-wide sustainability still depends on efficient irrigation, ecosystem restoration and upstream-downstream coordination.
- Partial recovery in one sub-basin does not remove wider structural water stress.
- The policy lesson is that scale determines both diagnosis and response.



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WHY THE ARAL SEA REMAINS A CLIMATE-RISK CASE

- Higher temperatures raise evaporative demand and aggravate drought pressure in an already stressed basin.
- Climate change therefore multiplies risk within a system already weakened by past water diversion.
- This makes adaptation harder because governance must address both inherited damage and ongoing climatic pressure.
- The region is therefore a powerful case for climate-resilient water allocation.



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POLICY LESSONS FROM THE ARAL SEA BASIN

- Risk reduction requires basin-scale coordination rather than isolated local action.
- Efficient irrigation, ecosystem restoration and better allocation rules are central to long-term resilience.
- The case shows that environmental governance must integrate water, land, health and livelihoods.
- The Aral Sea therefore links environmental history directly to contemporary adaptation policy.



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