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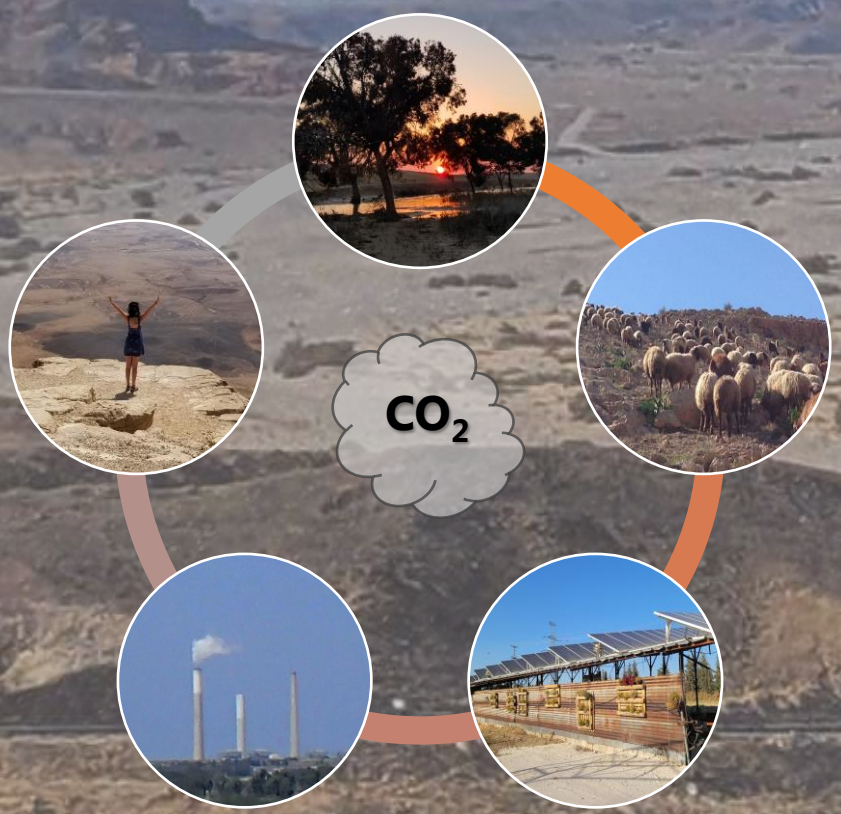
Turning Climate Challenges Into Community Resilience:

A Circular Approach to Watershed Management in the Desert

Merage DeserTech Competition

by Geo Teva Environmental Consultants
November 2021



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Turning climate challenges into community resilience

As climate challenges and weather extremes surge, and fertile soils are being lost to erosion, the need to improve land management practices take precedence.

Adjusting to acute temperature shifts, flash floods, sand and dust storms, and high sun intensity are issues that more and more communities are facing via desertification, yet whose solutions were established by desert communities throughout history (Nabateans, Bedouins, etc.).

With inspiration from the past combined with modern technologies, we can build solutions to minimize desertification and manage the challenges of the extremes.

With a circular economy approach to watershed management, it's possible to reduce runoff and erosion, sequester carbon, produce food and energy locally, and build resilient communities and ecosystems.

The Circular Approach to Integrated Watershed Management

Runoff Harvest and Erosion Reduction

Soil erosion can occur up to 100x faster under heavy tillage than under natural erosion[3], therefore improved management practices can significantly preserve precious soils. Terraces, furrows, or other rainwater detention zones can improve water retention in soils up to 37%[2] and manage runoff downstream. Soils management techniques which incorporate vegetation serve to slow runoff, support biodiversity, can provide food for locals and their livestock, and sequester greater sums of carbon and other pollutants.

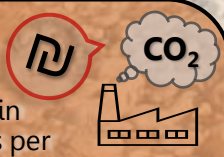
Grazing Techniques

Research shows that soil degradation is considerably greater under continuously grazed pastures[4]. Improved herd management implementing rotational grazing can improve local crop yields and increase carbon sequestration capabilities of soils and vegetation.

Renewable Energy

Installing solar PV on the rooftops of livestock pens or covering sun-sensitive crops (Agri-PV) innovatively produces energy locally while preserving open spaces. This simultaneously condenses land-use, reduces emissions, and provides a surface for rainwater catchment where appropriate.

Industry Incentives



A tax on carbon is expected in the near future, (~ 100 Euros per ton CO_2 by 2030)[1]. Many industries will thus seek to minimize emissions or fund carbon offset projects. Green Building, now required in all new development in Israel, encourages tree planting and renewable energy, increasing opportunities for offsets.

Community Resilience

This model for a circular approach to planning contributes to healthier more abundant livestock and crops, thereby increasing the production of goods for trade (crops, animal byproducts, handmade items). The result is a more resilient ecosystem and invigorated community able to pursue further endeavors.

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A model for calculating best-strategies for integrated watershed management

We suggest an integrative platform for geomorphological, ecological, agricultural, runoff management, attuned to climatic and cultural constraints.

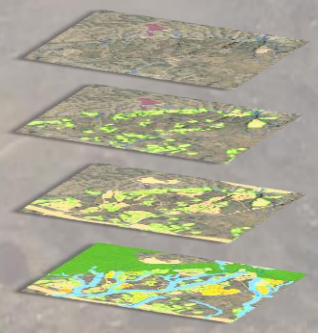
Our model begins by analyzing input data (soil type, watershed boundaries, precipitation, etc.) in a Geographic Information Systems (GIS) and Remote Sensing-based algorithm to plot recommended management practices for optimal land utilization and preservation.

With a Circular Economy approach, our model analyzes the constraints and opportunities within a designated area to produce holistic solutions to land management which build ecosystems and communities resilient to climate challenges.

For optimized benefit, project success and longevity, each project is optimized to suit the customs of the local society as well as the existing bioregion, anywhere in the world.

Stage 1: Input Data

Watershed boundaries, natural characteristics, disturbed areas, existing development, planned development

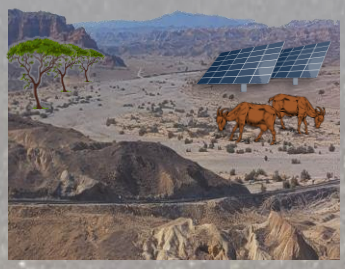


Stage 2: Identify Opportunities

Determinization of best areas for preservation, terracing, grazing, planting, energy production, water catchment, and more

Stage 3: Optimize to local populace

Based on results of Stage 2, the user chooses vegetation and livestock appropriate to their bioregion/culture, then receives calculated results for carbon sequestered.



Streamlined tool for planners

With the upcoming carbon tax, the newly required Green Building Standard, and increased efforts to reduce Israel's Greenhouse Gas Emissions, this model serves to streamline planning to optimize the location of each project aspect. With this tool, the economic benefits to the project contribute simultaneously to environmental and community health. Entrepreneurs can understand their capacity to effectively address climate challenges and can find funding with industrial partners looking to offset their carbon emissions. The following parameters can be identified and calculated:

- Agriculture
- Tree planting
- Grazing
- Terraces
- Preservation
- Native Vegetation
- Dwellings
- Fiscal contribution to local economy
- Renewable Energy Production
- Carbon Sequestration

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