Green Technology Book 2022

Solutions for Climate Change Adaptation

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Global Challenges Division
World Intellectual Property Organization (WIPO)
WIPO GREEN Platform

• WIPO GREEN platform, major visible implementation
• Combines all assets
  – Database
  – Projects
  – Partners
  – Resources / knowledge material
Problems – Solutions

• When you encounter a problem, you look for solutions
• Impacts from climate change are increasingly a problem
• We point to solutions
• Adaptation is complex and highly varied
• Technology can provide some of the solutions - and is available
• But uptake is too slow and we need adaptation action now
“The human capacity to innovate will enable us to survive”

Jamaica Tourism Minister, COP27, BBC 8Nov2022
The Green Technology Book shows solutions - a digital first publication

The Green Technology Book takes a look at the case of some green technologies responding to some of the most critical challenges of climate change.

In the 2022 report, we present the technology trends and practical solutions to combat climate change impact on agriculture and forestry, the water sector and cities.

How can innovative technologies and the intellectual property systems help us adapt to climate change?

The Green Technology Book illustrates how hardy innovation partnerships are generating a wealth of green technology solutions.

Drawing on a rich database of technologies - whether proven, frontier or still on the horizon - the report offers practical and inspiring examples of green technologies that can help people adapt to the reality of climate change.

We should take encouragement - and inspiration - from the slow range of transformational tools to help communities adapt to climate change.

- Green technology solutions to our changing environment
- Climate-change adaptation, technology and innovation
- The future of climate-change adaptation

Evren Tunc
WIPO Senior Economist
3 Technology areas: Agriculture & Forestry
Water and Coastal Regions, Cities

Chapter 3
Agriculture and forestry
Climate change is leading to multi-billion dollar losses in crop yield and affecting the health of forest ecosystems. Technology can help farmers and forest managers monitor crop and forest health, adapt their practices, use resources more efficiently and manage climate risk.

This chapter presents solutions within agriculture and forestry that respond to climate change impact on food security. It explores proven, frontier and horizon technologies ranging from local and indigenous techniques to urban farming, hydroponics and high-tech digital solutions. Sections take a look at technologies for climate-resilient plants, healthy soils, irrigation, livestock and forest protection. Because the right information at the right time can be vital, the chapter also looks at early warning systems and solutions for monitoring and forecasting climate change impact.

Explore technologies
Climate-resilient plants  Healthy soils  Farming technologies  Irrigation
16 Technology sections

Chapter 3. Agriculture and forestry

Farming technologies

Since the Green Revolution of the 1960s, technological change has played a key role in maintaining agricultural productivity and resilience. Faced by an increasingly complex climate landscape, innovations such as vertical farming and precision farming are attracting interest. The world is now in expectation of what is likened to a fourth agricultural revolution.

Floating gardens of Bangladesh
Around a quarter of Bangladesh is flooded for several months of the year. This causes soil salinity and disruption to agriculture. Floating ... Read more

Digital farming technologies in Africa
Farming technologies that rely on robotics, indoor farming systems and biotechnology yet to reach mass scale in Africa. However ... Read more

Proven technologies
Examples and Proven, Frontier & Horizon groups

Floating gardens of Bangladesh
Around a quarter of Bangladesh is flooded for several months of the year. This causes soil salinity and disruption to agriculture. Floating gardens can support rice and harvesting to be done around the clock. ... Read more

Digital farming technologies in Africa
Farming technologies that rely on robotics, indoor farming systems and biotechnology are yet to reach mass scale in Africa. However, they are already starting to appear on the horizon. ... Read more

Proven technologies

Precision agriculture through IoT technology and sensors
Libelium provides a wireless sensor network platform whose many uses includes precision agriculture. The technology uses internet of things (IoT) ... Read more

Robotic farming technologies for precision agriculture
Autonomous robotic farming technologies developed by SwarmFarm Robotics enable precision application of nutrient and crop protection inputs. The ... Read more

Frontier technologies

Horizon technologies
200+ Individual solutions

3. Agriculture and forestry / Irrigation / Proven technologies

Smartphone control of alternative energy powered irrigation system

TECH INNOV NIGER

The founder of the Tech-Innov company, Abdou Maman, has developed a remote-controlled irrigation system adapted to the semi-arid conditions of Niger in West Africa. It introduces the concepts of digital farms and tele-irrigation in support of agricultural development in the country. The company provides farmers with tools enabling them to move away from manual watering and reduce water waste. The system uses mobile devices so farmers can manage irrigation remotely and efficiently. It also integrates hydraulic and meteorological data so farmers can optimize water usage.

- Contracting type: For sale
- Technology level: Medium
- Country of origin: Niger
- Availability: Niger

4. Water and coastal regions / Marine ecosystems / Proven technologies

Artificial reefs

Reefmaker

Reefmaker’s patented process for artificial reefs uses Florida limestone. This soft rock matches the pH levels of the ecosystems targeted and provides a good substrate for marine life, allowing it to grow naturally. The limestone is attached to a concrete structure in a sloping design to ensure durability while increasing surface area for reef. A special deployment vessel equipped with cranes has been designed for accurate placement of the artificial reefs out to sea. In addition to coral reef restoration, the limestone reefs can also be used for oyster reef restoration, wave attenuation and erosion control. Structures can be designed to fit along the length of permanently fitted vertical poles attached to the sea bed. The aim is to keep the concrete proud of the marine floor and firmly retain the artificial reefs during extreme events like hurricanes. More than 50,000 reefs have been deployed along the US coast.

- Contracting type: For sale
- Technology level: Medium
- Country of origin: United States
- Availability: United States

5. Cities / Infrastructure and services / Proven technologies

Decentralized water treatment and storage systems

Fluence Corporation

Resiliency in water infrastructure can be enhanced through decentralized water treatment and storage systems. Treating water at point of use can make water treatment more fit for purpose and effective compared to treating all water to a potable standard. Also decentralized water storage could be used for river flow management, irrigation or in emergency situations. Fluence is a company that provides modular, decentralized water and wastewater treatment solutions for remote locations. Water treatment systems are built into steel shipping containers. Transportation and site preparation is easy and installation quick. The technology has been developed for use in resorts and recreation sites, but similar solutions could potentially be used in emergency situations. For example, storms and hurricanes where central water supplies may be damaged or contaminated.

- Contracting type: For sale
- Technology level: Medium
- Country of origin: United States
- Availability: Worldwide
### Smartphone control of alternative energy powered irrigation system

**FARMING & FORESTRY > IRRIGATION**

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Remote-controlled irrigation system to manage irrigation remotely and efficiently.

The founder of the Tech-Innov company, Abdou Maman, has developed a remote-controlled irrigation system adapted to the semi-arid conditions of Niger in West Africa. It introduces the concepts of digital farms and tele-irrigation in support of agricultural development in the country. The company provides farmers with tools enabling them to move away from manual watering and reduce water waste. The system uses mobile devices so farmers can manage irrigation remotely and efficiently. It also integrates hydraulic and meteorological data so farmers can optimize water usage.

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WIPO FOR OFFICIAL USE ONLY
WIPO GREEN Database a central tool

- Free UN-based public database
- Major repository of innovative green technologies and needs
- Automatic matchmaking
- AI-based search functions
- “Patent2Solution” search
- 127,000 articles
- 3000 user uploads
- Simple registration and upload
Conclusions drawn from the work

• Adaptation solutions are available and they are varied
• Nature-based and no-regret solutions gaining attention
• Many solutions are both adaptation and mitigation
• Local adoption and customization often required
• High-tech also relevant in less-developed regions
• Adaptation still well behind mitigation but funding increasing
• Make solutions good business
WIPO Green Technology Book 2022

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Short Impact & Adaptation Survey: