

SUSTAINABLE CITIES AND COMMUNITIES

CONTRIBUTIONS OF EMBRAPA

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Technical Editors



**Brazilian Agricultural Research Corporation
Ministry of Agriculture, Livestock and Food Supply**



Sustainable Development Goal 11

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Chapter 5

Advances and future challenges

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Introduction

In this book, the contributions of Embrapa to achieving SDG 11 were presented in detail in four chapters regarding actions that contribute to the construction of inclusive, safe, resilient and sustainable human settlements and cities.

Embrapa played an important role in providing technological solutions to Brazilian society, especially to managers, who are in charge of strategic decisions.

Advancing unplanned urbanization over rural areas has been causing several negative environmental impacts, such as forest destruction and changes in water resources. Poor or non-existent basic sanitation services are common in cities and in the countryside and pose risks to human health and the environment. To change this and other realities, planning, territorial management, food production and clean energy, as well as the proper use of water, are of utmost importance.

Highlights of Embrapa

The integrated perspective of territorial intelligence comprises the multiple dimensions of the development process: environmental, agrarian, agricultural, rural, urban, cultural, socioeconomic, etc., which can lead to the proper functioning of the Brazilian space.

Embrapa collaborates with knowledge, such as decision support systems, softwares, applications, agricultural and hydrological models, technological solutions for food production, monitoring tools and platforms. This is of strategic importance for all sectors of society, whether in urban or rural areas.

Embrapa Territorial, an Embrapa Decentralized Unit (located in Campinas, state of São Paulo), provides data and information on the national territory so as to strengthen governance actions on public and private management of agricultural

production chains and to anticipate future challenges based on territorial intelligence. In addition, all Embrapa Units contribute by providing knowledge to foster sustainable development.

Information available in the databases of Grupo de Inteligência Territorial Estratégica (Strategic Territorial Intelligence Group – Gite) offers summaries and diagnoses for any Brazilian state or region on five themes: natural, agrarian, agricultural, infrastructural and socioeconomic frameworks. Gite services have been supporting the planning, implementation, monitoring of actions, the evaluation of policies and public and private investments, in several production chains and geoeconomic regions. Such information is used by governments to carry out concrete actions at the municipal, state and federal levels.

Of important notice is Embrapa experience in using simulation models to evaluate the effects of different technologies or environmental conditions and in making available spatial data that can support studies and assessments of changes in weather patterns or in conditions of land use and cover.

Also highlighted are Embrapa efforts to find alternatives, products and processes for energy production and for rational use of water and to support urban and peri-urban farming especially by offering training courses and by conducting research studies on the theme, thus contributing to food production and well-being and health in the cities.

Future challenges

The path to achieving SDG 11 is long, and Embrapa has already identified trends, challenges and opportunities as a way to define strategies for action.

Among the various challenges and opportunities already identified, Embrapa will continue to focus on: a) developing innovative agricultural risk management systems by integrating climatic, technological, socioeconomic, environmental and market aspects; b) developing new production systems that include rural multifunctionality and integrate food, fiber and energy production into non-agricultural economic activities (e.g. rural tourism and ecosystem services); c) developing innovative digital tools that allow remote monitoring and constructing scenarios to support management institutions and production process players in making decisions on land use and regional water resources; and d) improving regional analyses on new technological, social, economic and demographic trends, in order to reduce the “social differentiation” process.

Brazil commitments to the COP21 Sustainability Agenda requires the continuous increase in biodiesel rate in the blend with diesel. This increase must take place with guaranteed biofuel quality in accordance with nationally and internationally defined criteria. Limitations due to microbial contamination and storage stability require special attention from researchers so that they can help to foster development and transfer of knowledge and technologies necessary to guarantee biodiesel quality (Souza Júnior et al., 2017). There are several opportunities for greater efficiency and competitiveness for the biodiesel and bio-kerosene production sector by means of diversifying raw materials and products used. According to researchers from Embrapa Agroenergy, the use of waste and co-products as raw material for producing both biofuel (from other production chains, in addition to the soy chain and animal production) or higher value-added bioproducts (using waste and co-products of the biodiesel and bio-kerosene production chain), meets this set of opportunities. This diversification may include using waste and co-products from other agricultural, agro-industrial and urban waste production chains, which are not yet directly related to the biofuel production chain. An example would be the production of “biocrude oil” from floating sludge from sewage treatment plants, which is previously refined for biofuel and other higher value-added bioproduct production (Souza Júnior et al., 2017).

Regarding forest biomass for energy, in which case Brazil has a competitive advantage in the world context, it is necessary to address the following challenges: the lack of developed germplasm adapted to different areas of Brazil; gaps to increase forest crop productivity in single and integrated systems; low technological level of traditional methods for converting wood into energy; few technologies to generate more complex energy products for specific purposes.

In 2017, the Brazilian government launched the Plano Nacional de Internet das Coisas (National Internet of Things Plan) (Produto 8, 2017), detailing policies and strategies for implementing technologies to connect devices and equipment. Priority areas are: health, smart cities, industry and rural areas. According to the plan, it is expected that these policies will be implemented already between 2018 and 2022. Using IoT in agriculture is still beginning. However, there is great potential for doing business, reducing costs and increasing productivity. Some challenges in this area are:

- Feasibility of business models that capture complex relations involving great multidisciplinary and different types of companies in search for providing profitable agribusiness solutions for all players.

- Creation of IoT-based collaborative technological laboratories for advanced research in sustainable agriculture, so as to allow the use of IoT in the countryside and to promote training for its use in the rural environment. An important issue is integrating, adapting and training family farmers in this new reality.
- Integration and use of open standards that allow data and information communication in all domains, especially in rural areas.
- Sharing of data through a middleware platform that integrates different data sources.
- Presentation of public policies for the IoT in agriculture sector, whether in terms of economic incentives or regulatory matters.

Thus, Embrapa, together with partner institutions, expects to increase its value delivery to Brazilian society by means of producing impacting results that contribute to positive and consistent changes, both in rural and urban areas in Brazil.

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