



LOCAL AGROECOLOGICAL KNOWLEDGE: PATHWAYS TO CLIMATE CHANGE ADAPTATION AND TO RESTORE THE CAATINGA BIOME

AURÉLIO PADOVEZI, MARIANA OLIVEIRA, LUCIANA BUAINAIN JACOB

EXECUTIVE SUMMARY

Main Results

- In Brazil, drylands will be the most affected region by climate changes. The global warming, expected for the next decades, should affect food security in the poorest areas, incapable of adapting to the expected transformations;
- The multiple uses of rural properties provide greater resilience to climate changes than monoculture systems. The plurality of cultures guarantees the farming families' food security, as well as diversifying income – aspects of great relevance in the vulnerable socio-economic context of the northeastern backlands population;
- Recognize and value local knowledge about the use of regional native species and agroecological-based productive systems opens a door of opportunity to implement the National Determined Contributions (NDC) and to diminish local vulnerability, allowing social inclusion through the empowerment of women in the Brazilian drylands;
- The inclusion of regional native tree species in agroecological and multifunctional productive systems may set up an important strategy for the recovery and conservation of the Caatinga biome, since it combines a sustainable production of food with the conservation of native vegetation;
- The entrepreneurial role of women from the municipality of Pintadas was a key factor for the construction of a labor cooperative along with a fruit pulp factory, as well as for the promotion of agroecological practices adapted to the local climate conditions.

CONTEXT

The 20 million people who live in the northeastern backlands shall face the most drastic transformations caused by climate changes in Brazil. Regional climate changes forecasts indicate that Brazilian drylands will become even drier. With an increase of at least 2 degrees in temperature, diseases may also increase, as well as a loss in agricultural production, which might trigger new migratory waves.

In the life experience of millions of family farmers lies a valuable source of knowledge and practices of coexistence in the drylands, developed throughout generations who, periodically, had to endure extreme climate events. Such knowledge has the potential of supporting the fulfillment of the local population needs in terms of food production, raw material for clothing, medicinal products and construction.

It is critical to identify, comprehend and register such knowledge. It may server as a source of learning and inspiration for the development of adaptation strategies which may underlie public policies for tackling the negative consequences of weather patterns modifications.

Working Papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate timely discussion and critical feedback, and to influence ongoing debate on emerging issues. Working papers may eventually be published in another form and their content may be revised.

Suggested Citation: Padovezi, A., Oliveira, M. F., Jacob, L. B., 2018. "Local agroecological knowledge: pathways to climate change adaptation and to restore the Caatinga biome", Working Paper. São Paulo, Brazil: WRI Brasil. <http://wribrasil.org.br/pt/publication/conhecimento-agroecologico-local-caminhos-para-adaptacao-mudancas-climaticas-e-restauracao-da-caatinga>

ABOUT THE MANUSCRIPT

The context of this research are the activities of the *Adapta Sertão* project and also of the fruit pulp factory called “*Delícias do Jacuípe*”, managed by the *Ser do Sertão Cooperative* and located in the municipality of Pintadas, State of Bahia. The present manuscript is one of the results in the scope of the project “*Green Business Through Restoration in Drylands of Brazil*”, supported by Good Energies Foundation.

This study also fits in the context of a global effort to identify opportunities of forest landscapes restoration. The region of Pintadas was considered relevant for such end, since it presents registers of innovative solutions which conciliate income generation and social inclusion with fighting actions and adaptation to climate changes through restoration.

In the analyzed properties, it was observed the prevailing option for productive systems based in agroecology in consortium or in the form of agroforestry backyards. This characteristic constitutes a strategy of coexistence and adaptation to the great variability and unpredictability of rains in the drylands. The plurality of cultures guarantees the food security of farming families, as well as diversifying income – aspects of great relevance in the vulnerable socio-economic context of the northeastern backlands population.

This publication has, as its target audience, the community of the Caatinga biome’s farmers, technical assistance and rural extension technicians, environmental, agriculture and development governmental agencies, civil society and private sector organizations which work in dryland areas around the world.

Besides the *Adapta Sertão Network* and *Ser do Sertão Cooperative*, this research was also supported by *Rede de Desenvolvimento Humano* (REDEH) and the *C₃ – Floresta, Meio Ambiente e Energia* consultancy.

THE SPECIFIC PROBLEM OF RESEARCH

Historically, native fruits from the Caatinga biome have been harvested in an extractivist approach, only for the families’ subsistence. Today, the supply of native fruits for the *Delícias do Jacuípe* factory is done, predominately, through extractivism. As of this study, it is proposed that, along with extractivism, local productive systems start to implement the practice of regional native species planting, in order to contribute with the conservation of the biodiversity of the Caatinga biome, and also to increase the income sources of the local population.

This paper also contributes for the knowledge systematization about practices and local know-how in the adaptation to climate changes and in conservation and restoration of the Caatinga biome. More specifically, this study’s target is the registration of the ethnobotanical knowledge about the use of native tree species in a simultaneous process to the analysis of agroecological management used as a technology of agricultural production adapted to low water availability which guarantee, in medium and long terms, the sustainable supply of raw material to the pulp fruit factory *Delícias do Jacuípe*.

CONCLUSION AND RESULTS

In the region under study, there is a prevalence of agroecological-based productive systems in consortium with agroforestry backyards. This characteristic constitutes a strategy of adaptation to the climate conditions of the drylands.

In this scenario, the multiple use of rural property provides a greater guaranty of adaptation than the monoculture systems. The plurality of cultures guarantees the food security of the families and rural communities throughout the year, as well as the income diversity.

Approximately 30% of the analyzed properties have their production exclusively for subsistence. The main commercialized products are milk and dairy foods, followed by fruits, honey and corn.

Palm production (*Opuntia ficus-indica*) is present in all properties visited, predominately in consortium with other plants or arranged in agroforestry systems, being used mainly as food for sheep and cattle. Its relevance is directly associated to the animals' food security during periods of drought, since beef and milk cattle constitutes the main economic activity on most of the properties visited.

The use of palm distributed on the soil like a dry cover, cut in pieces, is an agricultural practice of incorporating organic matter into the productive system, contributing for soil carbon storage. Such practice improves the capacity of water retention and reduces the demand for chemical fertilizers. Notably, fertilization done in most of the properties analyzed is organic, specially manure, bio-fertilizers and green fertilization.

Fruit farming and extractivism of remains, although frequently mentioned in the interviews, do not have much commercial representativeness for the properties analyzed.

According to the interviews, the low involvement with fruit farming is due to labor shortage and lack of a strategic planning for processing and marketing of the products. The most cultivated species are *acerola* (*Malpighia glabra*), guava (*Psidium guajava*), papaya (*Carica papaya*), *pitanga* (*Eugenia uniflora*), mango (*Mangifera indica*) and *seriguela* (*Spondias purpurea*), besides watermelon (*Citrullus lanatus*) and pinecone (*Annona squamosa*).

The environmental knowledge of the farmers proved to be very broad, probably because of the time they live in daily interaction with the Caatinga biome: all the interviewees have been living there for more than 20 years and have agriculture as their main occupation. Besides the cultivated plants, than 59 species of the flora are known by the farmers, from which 47 are associated with some kind of use: 23 as food (people and/or animals), 3 with insecticide effects, 9 of good-quality wood and 32 medicinal (people and/or animals). The list containing the local flora species along with the respective ethnobotanic register and bibliographical references of use is presented in Annex II (in Portuguese only).

RECOMMENDATIONS

- **The local agroecological knowledge should be considered in the development of solutions for the adaptation to climate changes.** In the region under study, the result of the interaction between local know-how and agroecological practices with knowledge from the universities, government institutions of research and extension and non-governmental organizations has been quite favorable for the construction of strategies of adaptation and confrontation of climate changes;
- **Addition of regional native species in the agroecological-based productive systems can become a good strategy for the restoration of the Caatinga biome.** The economic value of the regional native species, combined with the local knowledge about its use, and its functional significance in the productive systems must be strengthened by public policies, technical assistance and rural extension. As a result, those species may be incorporated into the productive systems, establishing bio-diverse and more resilient agroforestry systems, with representatives from the Caatinga biome's flora;
- **Gender approach may contribute with the development of the business of agroecological products.** The protagonism of women in cooperativism and in local economy, as well as their participation as leaders in organizations, have enabled the construction of the pulp fruit factory *Delícias do Jacuípe*, the connection with suppliers, marketing strategies, factors that have resulted into the sale of products;
- **To encourage agroecological practices based on local knowledge and to improve the process and marketing of flora's products, considering gender approach, are important tools to create a strategy for the restoration of the Caatinga biome.** Such combination has the power to transform climate threat into an opportunity of recovering and conserving the Caatinga biome, preserving regional culture and improving local life quality. This approach opens a window of interesting opportunities which contribute to the fulfillment of international commitments undertaken by Brazil in climate, biodiversity and desertification combat agendas.

ACKNOWLEDGEMENTS

We are pleased to acknowledge our institutional strategic partners, who provide core funding to WRI: Netherlands Ministry of Foreign Affairs, Royal Danish Ministry of Foreign Affairs, and Swedish International Development Cooperation Agency.

WRI Brasil would like to thank Good Energies Foundation for enabling this research through the project "*Green Business Through Restoration in Drylands of Brazil*".

We thank the participation of all the male and female farmers involved in this research, enriching and facilitating this publication. This work also counted with the involvement of *Rede de Desenvolvimento Humano* (REDEH), led by Thais Corral, along with Marcelo Bastos and Daniele Cesano, who support the *Adapta Sertão* Network. We also thank the *Ser do Sertão Cooperative* (CoopSertão), the commitment of Girlene Almeida to make this work possible, as well as the colleagues Norma Rios, Valdirene Oliveira, Nereide Segala and Taise Barbosa. We thank the staff of *C₃ - Floresta, Meio Ambiente e Energia*, responsible for the in-field information gathering: Diego Serrano, Renan Kamimura, Rodrigo Valle Cezar and Simone Mazer. We thank Gabriele M. Preiskor for reviewing the list of species raised, as well as for doing the bibliographic review about the use of such species.

The authors also thank the people who have contributed to the review and the improvement of this document: Carlos Nobre, Felipe Melo (Federal University of Pernambuco), Girlene Almeida (CoopSertão), Marcelo Bastos (REDEH), Miguel Calmon (WRI Brasil), Rachel Biderman (WRI Brasil), Renata Marson (WRI Brasil) and Viviane Romeiro (WRI Brasil). The authors would like to recognize the following colleagues and partners for their valuable support with reviewing, editing, promotion and design: Fernanda Boscaini, Antônio Falcetta, Carolina Fillmann, Mariana Gil and Mauricio Boff.

ABOUT THE AUTHORS

Aurelio Padovezi is Restoration Project Manager of the Forests Program at WRI Brasil.
Contact: aurelio.padovezi@wri.org

Mariana Oliveira is Research Analyst of the Forests Program at WRI Brasil.
Contact: moliveira@wri.org

Luciana Buainain Jacob is Post-Doctorate in Social Sciences by the Center of Social Studies of University of Coimbra, doctorate in applied ecology by the University of São Paulo, master in education by the University of Brasília, graduated in agrarian sciences and agriculture engineer by the University of São Paulo.
Contact: lucianabjacob@gmail.com

ABOUT WRI

World Resources Institute is a global research organization that turns big ideas into action at the nexus of environment, economic opportunity and human well-being.

Our Challenge

Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

Our Vision

We envision an equitable and prosperous planet driven by the wise management of natural resources. We aspire to create a world where the actions of government, business, and communities combine to eliminate poverty and sustain the natural environment for all people.

Our Approach

COUNT IT

We start with data. We conduct independent research and draw on the latest technology to develop new insights and recommendations. Our rigorous analysis identifies risks, unveils opportunities, and informs smart strategies. We focus our efforts on influential and emerging economies where the future of sustainability will be determined.

CHANGE IT

We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base. Then, we work with partners to deliver change on the ground that alleviates poverty and strengthens society. We hold ourselves accountable to ensure our outcomes will be bold and enduring.

SCALE IT

We don't think small. Once tested, we work with partners to adopt and expand our efforts regionally and globally. We engage with decision-makers to carry out our ideas and elevate our impact. We measure success through government and business actions that improve people's lives and sustain a healthy environment.

SUPPORT



Copyrights 2018 World Resources Institute. Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional. Para ver uma cópia da licença, visite <http://creativecommons.org/licenses/by/4.0/>