

Habitat Marte as a tool to promote space social inclusive education and SDGs

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Introduction: Habitat Marte

HABITAT MARTE is based in a Brazilian semiarid region affected by lower precipitation levels. This landscape affects the sustainability of populations based in this area. The potable water scarcity affected by climate change challenges scientists to think about how to live in these areas affected by more frequent severe droughts. They need to answer: **What are the technologies that permit to live in this condition bringing a better quality of life?** Incredibly, space technologies would be one the better answers. **HABITAT MARTE** is dialoguing about how Space would collaborate to Earth sustainability and how some research in sustainability would be important to space.

Habitat Marte: actions for inclusion

HABITAT MARTE can be identified as a hotspot of dialogue on space technologies and social inclusion. The main actions developed are:

- the space analog missions;
- reception of schools and universities students;
- lectures for STEM popularization;
- participation in expositions;
- development of research.

Sustainable Development Goals

All months **HABITAT MARTE** receive students from different schools. What We are doing is very connected with Sustainable Development Goals (SDG): We are sharing social Technologies to combat POVERTY (Goal 1), Hunger (Goal 2), delivering Quality Education (Goal 4) for developing societies and encouraging youth and Girls (Goal 5), visualize opportunities of Decent Work and Economic Growth (Goal 8) Innovation and entrepreneurship (Goal 9) and Reduction of Inequalities (Goal 10). For **HABITAT MARTE** is important Partnerships (Goal 17).

We consider an opportunity for your organization interact with us, in terms to promote the sustainable development in Latin America. (Julio Rezende)

Space Aqua

Aquaponics System is a cultivation method without soil, generating vegetables and fish as final products. Compared with other cultivation methods,, the aquaponics system uses 90% less water than the others. Considering this characteristic, the Aquaponics System is very strategic for places with limited water resources, which motivated the research.



Methodology of aquaponic system

1. Introduce how automation can act as a facilitator to assist social innovation and promote space inclusive social education.
2. Analyze ways to replicate key-results from operationalization of the Habitat Mars BioHabitat greenhouse to low-impact communities.
3. Highlight how Habitat Marte spin-offs can be helpful in making communities more resilient and self-sustaining.
4. To correlate the technologies and activities developed at Habitat Marte with Sustainable Development Goals (SDG's).

BioHabitat Food Production System

BioHabitat is a Controlled Environmental Life Support Systems (CELSS), with a floor area of 12m², that contributes to the formation of an analogous space ecosystem or laboratory conditions focused on food production to meet the demand for longer workload missions.

To guarantee properly operation and correctly follow of commands previously designated for decision making in the greenhouse, automation is the key factor.

Results

The operating technology BioHabitat greenhouse is an aquaponics system that produces tilapia fish in a tank. The water from this container serves to irrigate beds where different foods are grown that will be used to provide food for teams that participate in analog missions on Habitat Marte.

One of the main challenges in the operation of Habitat Marte is to provide self-sustainability during missions.

Conclusions

Doing relevant data collection and treatment could make easier the management of water and maintenance of food production systems on the most vulnerable ecosystems and communities.

Integrating these researches on specific subareas of sustainability, agriculture and space will develop efficient mechanisms collaborating with human sustainability.

