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Rebuilding Puerto Rico after Hurricanes Irma and Maria. The resistance of the suburban settlement culture in the Caribbean

Abstract

This short study documents a summary of the cultural and technical debate on 'reconstruction' developed in recent years in the specific context of Puerto Rico, following the environmental and economic disaster caused by two successive hurricanes on the island in 2017, Hurricane Irma and Hurricane Maria. The design interventions and long-term visions promoted through an initiative, Puerto Rico Re_Start, led after the disaster by the University of Florida, with the support of the main local universities, and the housing solutions developed by the most culturally active architects of the island, show that the typically American suburban settlement culture, despite the evident risks, continues to be the preferred choice of Puerto Ricans. The text also highlights, through reference to some field studies carried out by a Sapienza University team within the initiatives of the University of Florida, the insufficiency of the suburban settlement model compared to the mobility system and the means of transport most commonly used on the island.

Keywords

Caribe — Climate Change — San Juan

Rebuilding between policies and business

'Rebuilding cities' and 'restructuring territories' is one of the activities practiced by mankind following war events or environmental disasters, and has often corresponded in the history of civilizations to an act of political affirmation aimed at restoring order and security conditions. In modern times, in particular, 'rebuilding' has corresponded to the implementation of actions defined by political programs managed through technical and cultural tools whose effectiveness can be distinguished on the basis of the historical moment, the geographical context and the level of technological and technical knowledge.

This short study documents a summary of the issues surrounding the 'reconstruction' debate promoted by Martha Kohen of the University of Florida with the University of Puerto Rico and the Polytechnic University of Puerto Rico in recent years¹, following the environmental and economic disaster caused by two successive hurricanes that hit the island in 2017, Hurricane Irma and Hurricane Maria (Fig. 1).

Puerto Rico, in particular, is an interesting case study also for introducing and documenting some aspects of contemporary design culture that are particularly widespread in countries affected in recent years by the effects of *Climate Change*, where the climate is basically tropical. With respect to this type of issues, which require very different and integrated skills, not many years ago the prerogative of engineering and environmental disciplines, significant institutional changes have taken place in many schools of architecture in the United States of America. On the basis of guidelines defined by national and federal governments, connected above all to funding opportunities, academics and architects, who until a few years earlier



Fig. 1
Puerto Rico, San Juan, 2018
(Photos by A.I. Del Monaco).

were directing academic structures or courses applied to urban design and landscape (Amale Andraos, Kate Orff of Columbia University in the City of New York), have directed their expertise to the problems and effects of Climate Change. Moreover, geologists, environmental engineers, agronomists, in fact, have established themselves as landscape professors (Katherine Hill at Virginia Tech and UC Berkeley) having emerged the need to hybridize curricular profiles and to systematically tackle complex problems; some *professors of Architecture*, - of architectural and urban design as they would be defined in Italy - (Martha Kohen, Nancy Clark, Jeffrey Carney of the University of Florida) have begun to promote fields of research on issues such as *Sea Level Rise*, *Built Environment Resilience*, etc., that is, issues considered priorities at the political level. Problems with respect to which even the local construction industry, considering the recurring environmental disasters and the trend of the real estate market, could no longer fail to be appropriately addressed by academic research.

However, if in the Anglo-Saxon countries, *Climate Change* is at the top of the political agendas, in recent months the European Commission has promoted the *Green New Deal* initiative, that is a set of political actions carried out with the aim of achieving neutrality in Europe climate by 2050. But this type of issues have interested the vast public and political debate for a long time, as evidenced by the works written by journalists and observers, particularly prolific in the USA: “If New York is the most advanced example of a metropolis that is redefining and restructuring itself to defend the climate, thanks to the commitment of the mayor [Bloomberg] in this sense, small and medium-sized cities such as Naperville and Santa Clarita testify that in the belly of America the collective need to become autonomous on energy is growing, managing to produce a quantity of resources from renewable sources capable of reducing the consumption of traditional fuels” (Molinari, 2012).

Even the reconstruction processes that affected Europe and Japan during the Second World War, which Mark Clapson defined in his essay *The Global Phoenix: from Destruction to Reconstruction 1945-60* (Clapson, 2019), involved politicians, central governments, architects, planners, public and private interests, companies and entrepreneurs, the vast public and the specialist public, and have identified in the construction of residences and lodgings the economic and social engine underlying the 'promise' of reconstruction. The United States of America contributed to the 'reconstruction' through reconstruction aid transferred to war-affected countries (such as the funds that financed the INA Casa program in Italy through the Marshall Plan), financing cultural diplomatic policy (Allais, 2018) on a global scale by supporting institutions such as World Heritage and UNESCO and the construction of homes for veterans and war veterans on their national territory.

What distinguishes the most recent cases of post-hurricane and post-earthquake "reconstruction", which countries with high seismic risk have implemented after drastic events, compared to the cases of post-war reconstructions in European countries, is the recurrence of cycles natural events and therefore the elaboration of a planning thought oriented to prevention as well as to the immediate solution of the problem. In many cases it is a real reformulation of the disciplinary matrix of the academic and scientific communities that have found in the flexible nature of the architecture, city and territory project the possibility of elaborating a redefinition of terminology, methodology and operational objectives².

In addition to this, another fundamental aspect to consider, confirmed by the historical case history of the realizations, is the choice of the construction system and the type of settlement. Almost always, for these projects of a suburban or extra-urban character, the solutions oscillate - simplifying - between the construction similar to the Levittown type (Marshall, 2015) - 140,000 homes, industrially produced wooden structure - and that of INA-Casa (Corsetti, 2020; Di Biagi, 2001) - 355,000 dwellings, traditional masonry with the use of reinforced concrete in place -, both social residency programs launched in 1947 and realized in a few years and based on the principle of low-cost construction and the use of hands. non-specialized work.

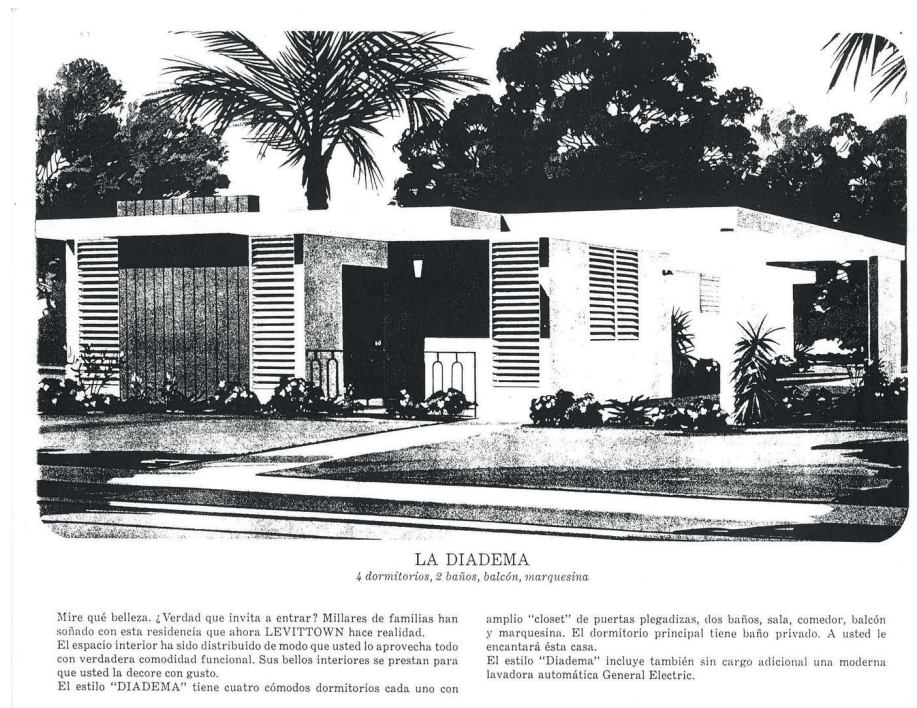
The American interventions were implemented by the government according to an idea of a city that Lewis Mumford defined «a uniform environment from which escape is impossible» and that William Levitt considered in the context of industrial production: «We are not builders, We are the General Motors of the housing industry». The interventions of the INA-Casa Plan or Workers Employment Increase Plan, on the other hand, was «a maneuver aimed at relaunching the economy and employment, building economic houses, but also as a device of 'institutionalized charity' on a national scale, of participation solidarity of all social components towards the needs of the poorest» (Di Biagi, 2001).

San Juan

In San Juan, the capital of Puerto Rico, a Levittown intervention was carried out in 1963 - one of the three floors (Pennsylvania, New Jersey, Puerto Rico) built directly by Levitt - in the municipality of Roa Baja, of which few "exemplary" dwellings survive. Mostly altered (Fig. 2). The old historic core of San Juan (Fig. 3), which dates back to the mid-sixteenth century, guarded and protected by a fortified citadel and walls, - today the

Fig. 2

Levittown, Puerto Rico, a brochure of houses' layouts "La diadema".

**Fig. 3**

Old San Juan, La Perla outside the urban walls. 1952. ICP.

Fig. 4

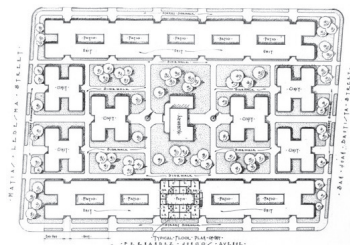
Aerial view. Luis Llorens Torres Public Housing Project. San Juan, Puerto Rico. 1950's. Rafael Picó, *Diez años de planificación en Puerto Rico*, Junta de Planificación de Puerto Rico-1952.



largest tourist and cultural center in the country with piers, airports and moorings for cruise ships - did not suffer major building damage after Hurricanes Irma and Maria. The traditional colonial-style building, as some scholars explain, - not very dissimilar from the constructive point of view to the INA-Casa interventions, were it not for the decorative elements and the vernacular references - was a strategy of the American government aimed at transmission, through the image of its architecture, of a precise idea of power: «In terms of architectural style, the Neo-classical and the Spanish Revival had been used by the American government as a symbol of its power and authority over its colonial territories» (Mignucci, 2014). But already from the 1940s and 1950s residential interventions inspired by the Siedlungen of German rationalism, multi-storey residential slats and individual house settlements in suburban neighborhoods were present in Puerto Rico (Fig. 4). This is due, in particular, to the presence of Walter Gropius and José Luis Sert³ at the Harvard Graduate School of Design, one of the most frequented universities still today by young people of the Puerto Rican *élite*, to the involvement of architects such as Richard Neutra in the projects carried out. for the island, in particular fifteen school buildings for outdoor teaching activities, and the settlement models promoted by the political leaders appointed to head the island government (Rexfort G. Tugwell appointed by Roosevelt and Jesús T. Piñero da Truman) who they directed the general lines of urban growth.

One of the significant building interventions carried out in those years, still inhabited, but unkempt, in Art Deco style (very common during the Roosevelt presidency) is the so-called *El Falansterio* (Fig. 5), not far from the colonial citadel and the airport for flights private.

In an interesting essay by Andrés Mignucci, Puerto Rican architect and lecturer, in particular, the reverberation of the CIAM congresses, the New Deal, etc., on the policies and construction projects started on the island starting from the 1940s, including the debate animated by a group of architects that also involved the younger generations, (Thomas Marvel, Jesús Eduardo Amaral, Efrer Morales, Horacio Díaz, Jorge del Río, René

**Fig. 5**

El Falansterio Site Plan, 1935. DTOP. Internal Courtyard. 1967. CRUV.

Ramírez, who played an important role in the following decades), mentors of the current professionals in various capacities, in support of an architecture that attempted to express the values of the housing culture of the tropics and was not only an expression of the *white modernist style*⁴. A dialectic not unlike the one that began about a decade later in the context of post-World War II Italian architectural culture.

However, in 1956, despite the political guidelines and experiments proposed by the most active architects in Puerto Rico during the previous years, the Federal Aid Highway Act signed by President Dwight D. Eisenhower financed the construction of a highway network of approximately 66,000 km and started subsidy policies for the purchase of cars, as in all the United States of America, marking the country's "suburban" destiny and the gradual renunciation of the construction of public rail infrastructures. Nevertheless, in the years that followed, some attempts were made in Puerto Rico: in 1969, starting from projects drawn up by Toro y Ferrer for the construction of a Downtown, a *Nuevo Centro de San Juan*, a system of skyscrapers integrated by pedestrian bridges was built. and from an elevated "San Juan Tren Urbano", an oversized investment that is still underused today, a sort of incomplete model district. Because, as the enlightened Puerto Ricans claim, over time the island has become "a huge parking lot", effectively summarizing the outcome of policies that have deliberately renounced the possibility of building a public infrastructure system on rail, which would almost certainly have led different fate, as it has been in other Caribbean islands.

Puerto Rico Re_Start⁵

In October 2017, the University of Florida's School of Architecture based in Gainesville welcomed seven students and three teachers displaced from San Juan after Hurricanes Irma and Maria that hit the island consecutively. On that occasion Martha Kohen, academic partner of the UNESCO Chair in "Sustainable Urban Quality" of Sapienza, former dean of the school of architecture of Gainesville and Montevideo, with a group of professors from Puerto Rico and American academics launched the hypothesis to organize a cycle of project research (the fourth edition is scheduled for 2021) entitled Puerto Rico Re_Start, aimed at producing addresses and guidelines to support the reconstruction process, involving local professionals, entrepreneurs, politicians, local public and private institutions in the comparison, etc. Puerto Rico Re_Start 1 focused on the case of San Juan by exploring several urban and suburban areas damaged by hurricanes, among the poorest and most difficult to access; Puerto Rico Re_Start 2 has developed a project for the north coast, in particular to the west of Puerto Rico, in places with potential tourist value and abandoned settlements; Puerto Re_Start 3 dealt with the difficult case of the west coast, the least developed, object of interest for hypothetical developments in the tourism industry, already partially occupied by biotechnology industries. Puerto Re_Start 4 (September 2021, tentatively) will apply to the study of the east coast and inland mountains. The research was carried out through collaborative workshops attended by Puerto Rican, American, Italian and other students (Erasmus and non-European mobility students at Sapienza University of Rome). Some of these themes have been explored after the workshop through degree theses or in the semester courses held by the various academic sites involved, and have been partially published (Canella, Del Monaco,

2018; Del Monaco, 2018).

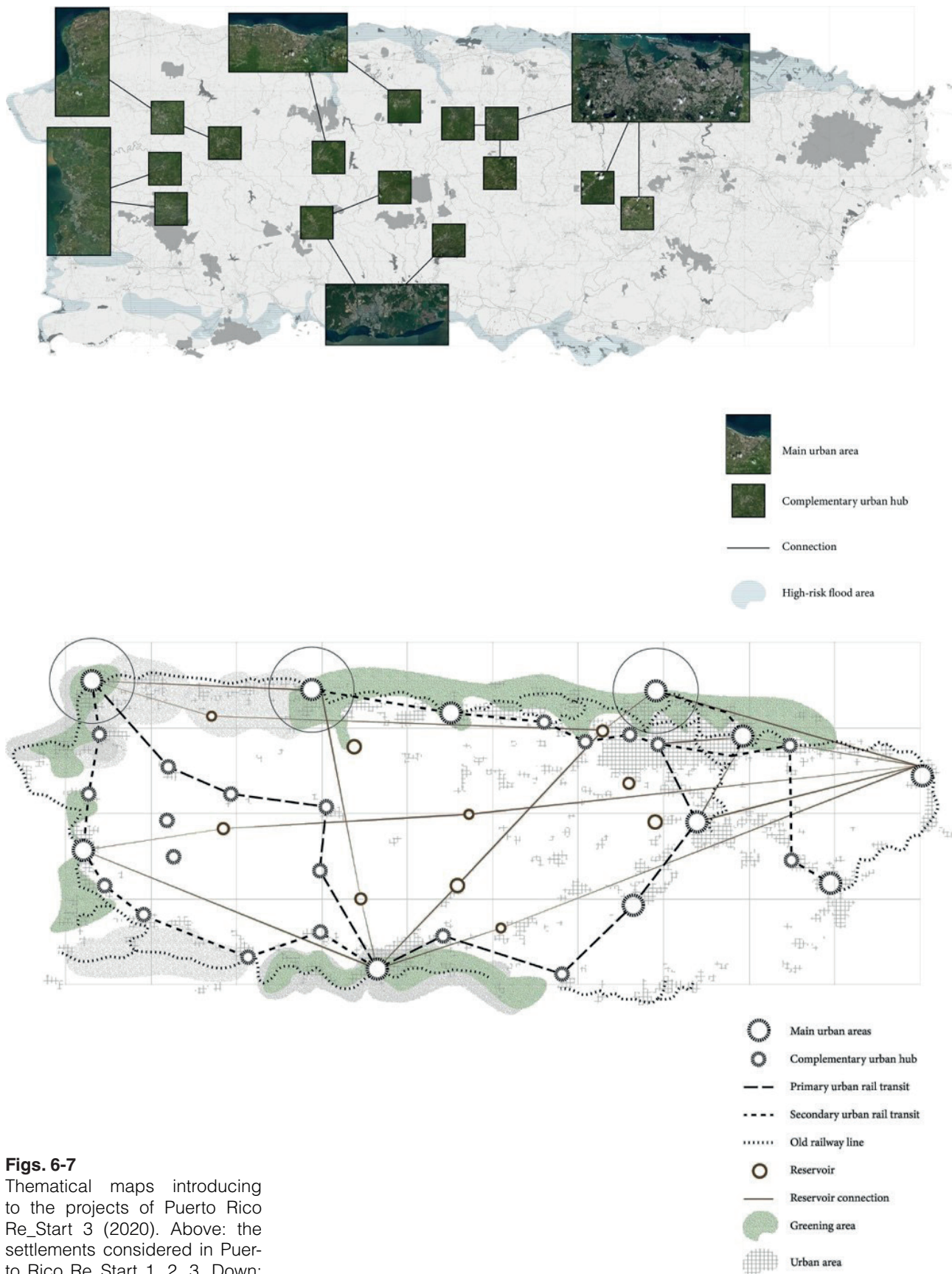
The third edition took place completely online in March 2020. For each edition, the Puerto Rico Re_Start workshop was accompanied by a real study conference that took place at the end of the day. In particular, as Edwin Melandez, Director of the Center for Puerto Rican Studies at Hunter College in New York explained during his speech, that of Puerto Rico, after the hurricanes, resulted in a “devasted economy: in 2018 it was expected that the Gross Domestic Product would have decreased by 11.2 percent, which would have included 90 billion in damages, and 21 billion in insurance costs; 100,000 houses damaged, 80% of which almost destroyed ». In addition, the Puerto Rican economist highlighted the serious problem of exodus and depopulation: about 40% of Puerto Ricans after Hurricane Maria emigrated to the United States (Chicago, New York and Florida). So much so that today, considering the traditional migration of the younger generations to the US, two / thirds of Puerto Ricans live in the United States of America - they have an American passport, but do not vote for the president - and have left the island; more than half of the population receives a monthly state subsidy of around 600 euros with which they tend to survive. The actions taken by the federal government were aimed at “solving the problem of illegal residences, providing long-term medical help, reducing taxes (EITC, CTC)”. These data give quantitative consistency to the metaphor used by Lucio Barbera⁶ in the closing speech of the Puerto Rico Re_Start 1 workshop (2018) to describe the case under study: the island of Puerto Rico is a settlement affected by “Urban Anemia”⁷.

«Relocate Renaturalise Reconnect»

Sapienza’s contribution to the 2020 edition, Puerto Rico Re_Start 3, led by who is writing and by the PhD tutor Matteo D’Emilio, proposed an intervention in the west of the island conceived in an integrated way with the rest of the territory and considering the studies elaborated during the edition 1 and 2: summarized under the title “Relocate Renaturalise Reconnect”. And he was partly inspired, as in the previous cases, in addition to the research directions defined by Martha Kohen and the Center for Hydro-Generated Urbanism for the scientific setting of the initiative, by the studies of Kristina Hill and other centers research projects that deal with similar project themes: «The best approach I know of can be simply described using three categories of actions: to protect, renew, and re-tool»⁸. The Sapienza group (six students from Tunisia, Romania, Indonesia, China and the Middle East, a teacher and a tutor) was given the task of studying the Aguadilla settlement by the organizers. The work took place with the times of an ex tempore managed online which lasted about three days. The proposed project actions can be summarized as it follows (Fig. 6-7).

Relocate: the coastal areas affected by flooding and hurricanes have posed the problem of relocating and move the inhabitants of the compromised coastal settlements to safer areas: one hypothesis could be that of the so-called “Complementarios” settlements (see Mapas Diagnosticos - Memorial del Plan de Uso de Terrenos della Junta de Planificacion, 2015), initiating an inevitable process of policies and incentives.

Re-naturalize: In particular, the settlements located at the foot of the internal hills could be the most favorable for reorganizing the territory, concentrating new and safer tourist facilities in the coastal area, reorganizing

**Figs. 6-7**

Thematical maps introducing to the projects of Puerto Rico Re_Start 3 (2020). Above: the settlements considered in Puerto Rico Re_Start 1, 2, 3. Down: the metropolitan railway network (primary and secondary), the water reservoirs, the areas to be re-naturalized, the areas suffering of flooding.

the agricultural sector (including that of the agritourism) both in the plains and in the hills in a more efficient and updated way.

Reconnect: to implement the aforementioned program it is proposed to build a new infrastructural railway network. Two light rail systems (primary and secondary) and a cableway useful for the connections of the internal settlements located on the hills and in the internal mountains that would be densified after the transfer of the inhabitants from the coast.

Instead of proposing the reuse of the railway line, now disused, which served the sugar cane plantations and which runs along the border of the island (an obsolete infrastructure), the proposed scheme provides for the implementation of a major metro line primary that connects San Juan to Ponce and Ponce to Aguadilla, following a “V” pattern, for a total length of almost 170 km - an overall realistic investment. The primary rail line could be supplemented by a secondary rail line and a network of cable cars powered by the energy production of the internal reservoir system (which could be upgraded and reused where it is inactive). The new integrated mobility system could attract different types of investors and give rise to a higher standard of quality of life, capable of attracting new inhabitants, both the elderly to live on the island of Puerto Rico in favorable climatic conditions or the youngest to start their business in a context that requires new energy and innovation with the support of oriented subsidies.

The integrated mobility system could favor different types of tourism (excursion, short stops during cruises) and to promote new forms of tourism in inland areas, linked to the rediscovery of local food products, fruit, agriculture, etc., considering that the most food products, including those of agricultural origin, despite the excellent climate, are currently imported.

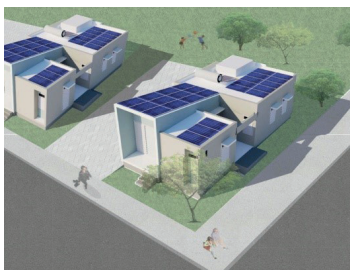
The general objective envisaged is to maximize the effect with limited interventions, creating diversified infrastructures, increasing the value of the land, the degree of safety, the standard of living, creating the conditions for a new type of productive activity and encouraging employment.

Provisional conclusions

The experience shared during the Puerto Rico Re_Start initiative made it possible to verify, by studying a realistic story, how much, despite the possibility that emergency and danger conditions recur⁹ - a category that some experts distinguish from risk - the identification with a certain type of settlement culture is a factor of resistance in the cultural identity of Puerto Ricans. Despite the obvious risk of living in single-family homes of the *steel frame structure* type, great-grandchildren of the Ballon Frame system and the Levitt system, especially poorly built and located in areas at risk. Many of the inhabitants of Puerto Rico, even those who belong to social classes in difficulty, do not give up the myth of the single-family house, but refuse to keep in order and cultivate a garden or vegetable garden which, given the climate, would be very simple to cultivate by integrating your family manager. The widespread unease among the inhabitants, as well as economic, is evidently also social: the weakest population remained on the island (by age and wealth). The most prominent architects in Puerto Rico, an integral part of the American architectural cultural élite, such as Jonathan Marvel¹⁰ (Fig. 8) and Francisco Javier Rodríguez-Suárez, illustrated some projects drawn up by their offices and their students for reconstruction: elegant and refined prefabricated individual houses that correspond

Fig. 8 a

Resilient Power, Puerto Rico,
Marvel Architects.
[https://marvelarchitects.com/
work/resilient-power-puerto-
rico/100](https://marvelarchitects.com/work/resilient-power-puerto-rico/100)

**Fig. 8 b**

Houses Designed To Help P.R. Survive Future Storms, Marvel Architects. Beyond the architectural solution, too schematic for some aspects, one of the technical aspects that we tried to affirm in the debate on reconstruction is the use and distribution of photovoltaic panels. The island, after the hurricane, remained several days without electricity, internet access, completely isolated. But buildings so small in size and light are not able to resist anchored on the ground to the passage of a hurricane; the same problem applies to photovoltaic panel systems.

to the idea of transportable temporary housing, also on wheels, relatively low cost, energy self-sufficient. Not much seems to have changed since Mr Levitt argued: «We are not builders, We are the General Motors of the housing industry»! Among other things, the «Tiny House Movement», «an architectural and social movement that encourages living a simpler life in a smaller space», as explained by an article in the Financial Times last May, whose success returned in 2008 with the crisis financial, but more recently with a Netflix series *Tiny House Nation* (Chen, 2020), demonstrates that the preference for this type of residential solution is not just a phenomenon for *dropouts* but the solution that affects millions of followers on the Instagram link, with about 1 , 47 million posts, linked to the hashtag #tinyhouse.

And it is for this reason, therefore, that the solutions proposed through the design exercise developed in recent years by the UNESCO Chair of Sapienza for Puerto Rico, have tried to support the *resistant* adherence of most of the local inhabitants to the suburban settlement model, which many scholars attribute to the timeless success of *Walden* by Henry David Thoreau, an indispensable cornerstone for American cultural identity (Updike, 2004), just as it took root on a Caribbean island where the Hispanic culture lives hybridized to the North American one. So as to return to consider the hypothesis of building infrastructures on iron and reversing the interpretation of the urban functioning of San Juan: from a historic-colonial center surrounded by a suburb to a metropolitan city of about 500,000 inhabitants - therefore quite similar to a city like Palermo - with a tourist center on the water.

The overall intent was to try to include in an idea structured for long-term interventions, thinking about the strengthening of rail infrastructures within a framework of economically eligible interventions, the address of local technicians, who instead tend to sell low-cost solutions and fast mass distribution, continuing to fuel the suburban single-family residential model.

Notes

¹ In particular, Puerto Rico is a Caribbean island located in the Atlantic Ocean, it was a colony of the Spanish crown and since 1898, after the Hispanic-American war, it has become an unincorporated territory of the United States of America.

² It is now well established that contemporary society from the mid-1980s onwards is considered *The Society of Risk*, as the work of Ulrik Beck anticipated and explained.

³ The works of J.L. Sert all'Havana (Cuba) in South America influenced strongly the architectural culture of Puerto Rico.

⁴ Mignucci A. quotes José Fernández, *Architecture in Puerto Rico*, (New York: Architecture Book) Publishing, 1965, p. 134, 240.

⁵ <http://puertoricorestart.org>

⁶ Lucio Barbera, chairholder dell'UNESCO Chair in "Sustainable Urban Quality and Urban Culture, notably in Africa" of Sapienza took part with Italian professors and students to three workshops in Puerto Rico Re_Start as academic partner of the University of Florida.

⁷ See Lucio Barbera's Twitt #urbananemia: "human settlement physically and functionally appears to be still in a good state but the demographic, social, economic and cultural resources are in a continuous silent decrease. The first symptoms of URBAN ANEMIA is the necrosis of marginal settlements" UNESCO;

<https://twitter.com/hashtag/urbananemia?src=hash>

⁸ Interview with Kristina Hill, <https://www.asla.org/ContentDetail.aspx?id=28548>

⁹ «... Risk is the form that a danger takes when it is transferred into the sphere of what can be administered. Nature is full of dangers, but it is modern technology that tends to represent them as risks, for example by quantifying their probability and attributing a cost to them.», Raffaele Alberto Ventura (2020), *Radical choc: Ascesa e caduta dei competenti*.

¹⁰ Marvel Architects; <https://marvelarchitects.com/work/resilient-power-puerto-rico/100>

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