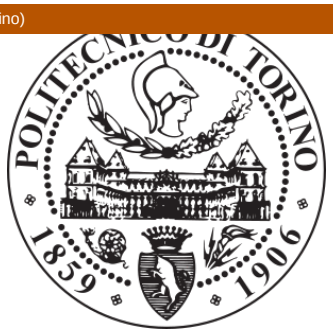

Renewing climate planning locally to attend the 11th Sustainable development goal in the tropics

Chapter 1
Renewing Climate Planning Locally to Attend the 11th Sustainable Development Goal in the Tropics

Maurizio Tiepolo, Alessandro Pezzoli and Vieri Tarchiani

Abstract In the last seven years, tropical cities with a climate plan have tripled compared to the previous seven years. According to the 11th United Nations' Sustainable Development Goal, climate planning should significantly increase by 2030. The Sendai framework for disaster risk reduction (2015) and the New urban agenda signed in Quito (2016) indicate how to achieve this goal through analysis, categories of plans and specific measures. This chapter identifies the main obstacles to the significant increase in tropical human settlements with a climate plan and the possible solutions. First of all, the distribution and trend at 2030 of tropical human settlements are ascertained. Then local access to information on damage, hazard, exposure, vulnerability and risk, and the consideration of these aspects in the national guides to local climate planning are verified. Lastly, the categories of plans and climate measures recommended by the United Nations are compared with those that are most common today, using a database of 401 climate plans for 338 tropical cities relating to 41 countries. The chapter highlights the fact that the prescription for treating tropical cities affected by climate change has been prepared without an accurate diagnosis. Significantly increasing climate planning must consider that small-medium human settlements in the Tropics will prevail at least until 2030. And most effort will be required from Developing and Least Developed Countries. The recommendations of the United Nations concerning the preliminary analyses ignore the fact that local authorities usually do not have access to the necessary information.

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Climate plans and recommended measures are not those currently in use. We propose three areas of action to facilitate the mainstreaming of the recommendations in the tropical context. They require a renewal of the local planning process if we intend to reach the 11th SDG by 2030.

Keywords Climate change · Climate planning · SDG · Mainstreaming · Open source maps · Open data · Plan guidelines · Vulnerability · Tropics

1.1 Introduction

Today, in the Tropics, one large or medium-size city out of four has a plan to reduce greenhouse gas emissions (mitigation and sustainable plans), the impacts of global warming (emergency, adaptation, resilience plans) or both (general, comprehensive plans). We don't know how frequent these plans are in towns (under 0.1 million pop.) and in rural areas. The resolutions of the United Nations, expressed in the 2030 Agenda for sustainable development (2015), in the Sendai Framework (2015) and in the New urban agenda (2016) supply numerous recommendations to "substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement… holistic disaster risk management at all levels" (UNESC 2016: 28; UN General Assembly 2015).

Getting started with 11th SDG requires more than a simple review of the long-term planning practices, developing need assessment, costing and monitoring (SDSN 2015), this last aspect being the current focus of much reflection on SDGs.

While knowledge of local climatic planning in the Tropics has increased in recent years (Seto et al. 2014), only recently have systematic analyses been developed (Macchi and Tiepolo 2014; Tiepolo et al. 2016; Tiepolo 2017) and vulnerability assessment and risk evaluation have been tested in urban areas (Sakai et al. 2016) and rural locations (Pezzoli and Ponte 2016; Tarchiani and Tiepolo 2016).

The objective of this chapter is to identify the obstacles to the mainstreaming of the United Nations recommendations in the Tropics and how to overcome them.

In the Tropics, the urban population is expected to rise by 43% by 2030: double the increase in the rest of the world (UNDESA 2014). This rapid urbanisation takes place in a context characterised by widespread underdevelopment (96% of Least Developed Countries-LDCs are in the Tropics) and the presence of advanced economies (Brazil, China, France, Mexico, Singapore, South Africa, Taiwan, USA). In advanced economies, plans and policies to support adaptation and the mitigation of climate change are consolidated, while in Developing Countries and especially in LDCs, there is a prevalence of community-based adaptation undertaken by Non-Governmental Organizations-NGOs and partners in development. This said, it is in the Tropics that certain measures to face climate change practiced

in advanced economies can be adapted and reproposed to LDCs, because they are conceived to cope with the same hazards.

The following sections analyse the 11th SDG, the recommendations relating to climate planning in the Sendai Framework and in the New urban agenda. Then identify today's distribution of tropical human settlements by demographic class and that expected by 2030. The next step is the consideration of access to the information necessary to develop the analyses of exposure, vulnerability, and risk recommended by the United Nations. Then the analyses recommended by the national guidelines to local climate planning are identified. Lastly, the most popular plan categories and climate measures in the Tropics are analysed. This highlights what is missing from the mainstreaming of the recommendations of the United Nations.

1.2 Materials and Methods

The international agenda on city climate planning is based on the 11th Sustainable development goal of the United Nations (UN General Assembly 2015), on the recommendations formulated in the New urban agenda (2016) and in the Sendai framework for disaster risk reduction (2015).

The tropical climate zone derives from Koppen Geiger according to the Trewartha ranking (Belda et al. 2014) (Fig. 1.1). Settlements with a population of less than 0.3 million are classed as towns, those with a population of between 0.3 and 1 million are defined as medium-size cities and those with over a million people are considered large cities. The 2014 revision of the World urbanization prospects (UNDESA 2014) supplies the urban populations at 2015 and those estimated at 2030 by size class of human settlement and by country. The figures are not supplied by climate zone. The tropical area comprises 113 countries, 22 of which also belong

Fig. 1.1 The tropical zone (T)

to other areas (subtropical and, sometimes, boreal) like the Andine countries, and various countries in Southern Asia and Southern Africa. The UNDESA information allows us to identify the inhabitants of the tropics only for settlements 0.1–0.3 million inhabitants. We don't know how many people live in settlements with less than 0.3 million inhabitants in the tropical area. We have assumed that these settlements have the same share of cities (>0.3 million pop.) falling within the tropical zone of the country in question. This gave us the population of the towns in the tropics. This information on the population by category of human settlements allows us to highlight the characteristics of tropical human settlements and their trend at 2030.

This chapter, however, aims to appreciate the current relevance of climate planning, so we need to compare the number of human settlements with the number of climate plans. We have to pass from the population of the urban agglomerations to the number of administrative jurisdictions, conserving the articulation by class of demographic size. The UNDESA database cannot help us in this analysis.

Consequently, we have prepared a specific database starting from the national censuses of the tropical countries. It has enabled us not only to identify the number of tropical human settlements with more than 0.1 million inhabitants, but also to identify the transition that human settlements will make from one class to another in the years to come, due to the urbanisation process, an aspect which is not considered by the UNDESA statistics. The new entries have been identified by applying the average growth rate 2010–15 of the cities of every tropical country (UNDESA 2014) to towns with less than 0.1 million inhabitants and considering all the towns expected to pass the population threshold of 0.1 million by 2030. The rates vary from 0.2% (Australia, Venezuela) to 3.7% per annum (Rwanda) which, in this last case, would take all towns that have more than 60 thousand inhabitants nowadays above 100 thousand by 2030.

The relevance of local climate planning and of the relative climate measures is obtained from two previous surveys (Tiepolo and Cristofori 2016; Tiepolo 2017) on climate plans in the large and medium size cities of the Tropics. The database used contains 364 plans related to 322 tropical cities in 41 countries, updated to December 2016. With the term local we intend the minimum administrative level with safety and environmental tasks, which comprise climate mitigation and adaptation. In most cases, this level corresponds to municipalities.

The capacity of cities to develop hazard, damage, exposure, vulnerability and risk analyses recommended by the United Nations depends on open access to hazard, vulnerability and risk maps on a local scale (municipal). The examination is carried out on the web, in just the 41 countries that currently have climate plans.

The analyses recommended today are based upon 13 guidelines for the preparation of local risk mitigation/adaptation/reduction plans. Some guidelines are national while others regard single states (Chiapas in Mexico, California, and Arizona in the USA) (Table 1.1). The information on climate plans and measures contained comes from our database on 364 plans for 322 tropical cities.

Table 1.1 Climate planning mainstreaming snapshot method

United Nations	Existing conditions			
Recommendations	Size class of settlement	D, E, H, R, V maps	Guidelines for local climate planning	Municipal climate plans
Information	–	Open source	Analysis required	–
Climate plan	Most frequent	–	–	Most frequent
Climate measures	–	–	–	Most frequent

D Damage, *E* Exposure, *H* Hazard, *R* Risk, *V* Vulnerability

1.3 Results

1.3.1 Future Climate Planning According to the UN Vision

The resolutions adopted by the United Nations General Assembly on the 2030 agenda for sustainable development (2015), the Sendai framework for disaster risk reduction and the New urban agenda (NUA) trace the path for improving and extending climate planning (UN General Assembly 2015; UNISDR 2015, UN Conference 2016).

The 11th SDG envisages a substantial increase in climate plans for cities and human settlements. The Framework and the NUA contain 25 recommendations related to climate planning: type of analysis, plan categories, type of climate planning. Emergency and risk reduction plans, zoning maps and development codes are recommended as well as seven climate measures: four for adaptation and three for mitigation. Next steps are: first, to check whether planning tools recommended by the United Nations are suited to the main type of settlement of the Tropics; second, to assess to what extent it is possible to increase the dissemination of climate planning given the planning capacity demonstrated over the past seven years; third, to learn if the analyses recommended can be implemented with the information available today; fourth, to learn if the types of plans and measures recommended have already been implemented or are brand new.

1.3.2 Importance of the Tropical Human Settlements

A third of the world's urban population lives in the tropics and this share is expected to rise by 2030. This will change the breakdown of human settlements by category of demographic size. Large cities (over one million inhabitants) are expected to pass from 38 to 44% of the urban population.

Table 1.2 Expected trend 2015–30 of large and medium size cities of the Tropics compared with the rest of the World (Tiepolo on UNDESA 2014)

Category of settlements	2015			2030		
	World	Tropics	World-T	World	Tropics	World-T
Large, over 1 million pop., %	41	38	43	45	44	46
Medium, 0.3–1 million pop., %	16	15	17	16	10	20
Small, under 0.3 million pop., %	43	48	40	38	46	33
Urban, %	100	100	100	100	100	100
Urban, million pop.	3926	1317	2609	5058	1887	3170

In 2030, six of the ten most populated cities in the world will be in the Tropics: Delhi (36 million population), Mumbai (28), Dhaka (27), Karachi and Cairo (25), and Lagos (24). Medium-size cities and towns (less than one million inhabitants) will drop but will continue to be the main settlement in the Tropics (56% of urban inhabitants by 2030) (Table 1.2).

These figures, obtained from UNDESA statistics, are produced by urban agglomeration, which, for large cities are made up of several administrative jurisdictions. Moreover, they do not consider that, as time goes by, the urbanisation process will add new settlements to the urban class. These aspects are essential to ascertain the relevance of the plans.

We have directly drawn data from the censuses of the tropical countries and considered the dynamics within the single categories of demographic dimension generated by the urbanisation process, which will bring 65 new cities among the large cities and 213 towns among the medium-size cities by 2030 (Fig. 1.2). These shifts will take large and medium-size cities to 1591 by 2030. In short, in the Tropics, medium-size cities and towns will continue to prevail until. This differentiates this climate zone from the others, in which large cities will take a clear lead in the next decade.

1.3.3 Relevance of the Effort Required

If climate planning succeeds in maintaining the pace of the last seven years until 2030 (31.6 plans/year) cities with climate plans will increase from today's 25 to 47%. We could consider this a "substantial increase" in the number of cities implementing climate plans. To reach complete coverage would require 90 plans/year: this value has never been reached before, not even in 2012, when a total of 70 plans were implemented (Fig. 1.3).

However, we need to consider that today's climate planning is the result of an outstanding commitment by the member countries of the OECD and the BRICS over the last seven years, which has made it possible to bring the respective

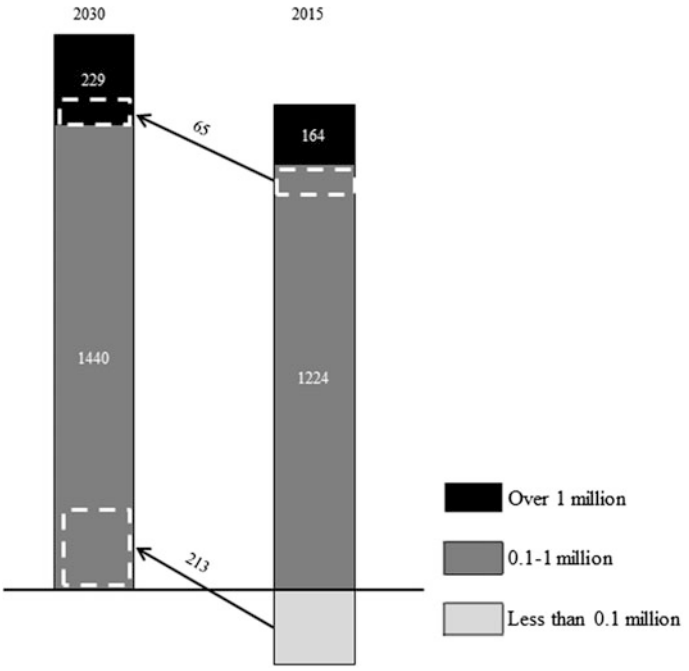

Fig. 1.2 Large and medium-size cities of the Tropics trends between 2015 and 2030

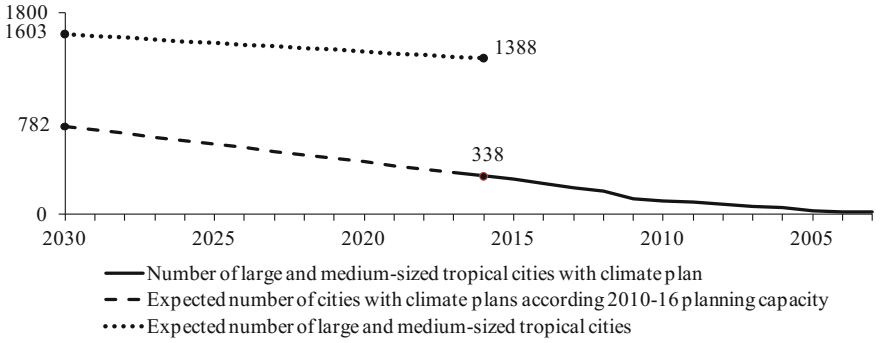

Fig. 1.3 Number of climate plans for tropical large and medium-size cities, 2003–30

contexts to 79% and to 62% the cities with a climate plan. In DCs and LDCs, cities with climate plans reach 22 and 35% respectively.

The 1062 tropical cities that still have no climate plan belong mainly to DCs and LDCs countries which, with just a few exceptions, have no urban climate planning experience. This will prevent maintenance of the pace that has characterised the last seven years in the coming fourteen (Fig. 1.4).

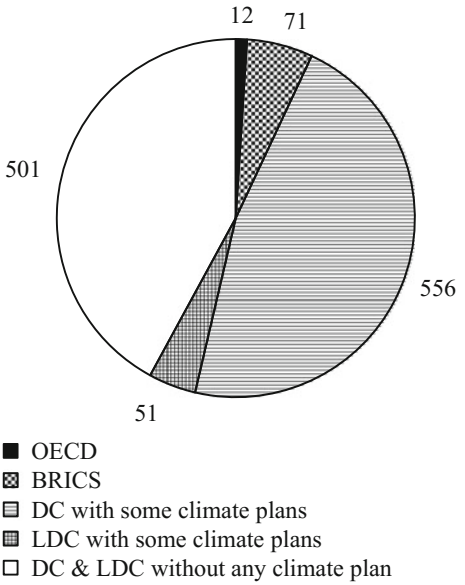

Fig. 1.4 Number of tropical cities over 0.1 million population still without climate plan according to the type of economy

Lastly, we must consider that all of today's plans will be obsolete in 14 years' time, needing a complete makeover. Consequently, the number of cities without a plan will be many more than today's 1062. Maintaining the pace of local climate planning in the future and ensuring that it includes the recommendations of the United Nations requires a reduction in analysis times and costs and a review of the planning process: in a word, the renewal of climate planning.

1.3.4 Basic Information for Analysis

According to the recommendations of the United Nations, the plans must be preceded by damage, exposure, hazard, risk and vulnerability assessments. These analyses can be developed quickly only if previously processed information is available to the municipalities. Otherwise, cities and towns must carry out occasional assessments as and when required. This phase would be simplified if local administrations had open access to a national system of vulnerability or risk tracking. This paragraph verifies the existence of this condition.

Today, of the 41 tropical countries that have cities with climate plans, 12 have open access information (hazard prone areas, vulnerability and risk) that help with the analytical phase.

There are two types of open access information. The first type is vulnerability and risk maps at administrative jurisdiction level, like risk map at municipal level in

Mexico. The second type localises hazard, vulnerability and risk on a topographic map (or on Google Earth) on a large scale (1:2000 in the case of Brazil, 1:5000 in the case of Réunion) or on a medium scale (1:50000 for the Northern territory, Australia). In other cases, the scale is too small or the resolution of the pictures is too low (Honduras, Peru). In some cases, in which web GIS is used, the user can choose the level of detail (Ecuador, Guyana, USA/Arizona, California, Texas) and the thematics (Malawi, Philippines), and export the information generated in numeric format (Table 1.3).

A special mention should go to climatic and hydrological data. While projects to provide open access to data observed and estimated have multiplied at global level (remote sensing, reanalysis, models, etc.), at local level, climate and hydrological data is still jealously guarded (apart from research applications) by the national hydrometeorological services due to the interest by governments in selling intellectual property for commercial applications (Overpeck et al. 2011).

This said, the big data-sets currently available offer a dual challenge: on the quality of the data used and on the use of such data locally for diachronic analyses (Goodge 2003; Faghmous and Kumar 2014).

All this information is essential to local planning because it allows the identification of flood, landslide or tsunami prone locations within the area of interest, sometimes in considerable detail. In particular, it is vital in risk reduction or adaptation plans to localise and quantify measures, including the risk transfer (insurance). It was with this in mind that maps were drawn up by FEEMA/USA. Producing these maps at local level would have been a long and costly job, especially for medium-size cities with few resources, and would generate different information in terms of scale, presentation and assessment from one city to another.

An effort is being made to encourage the tropical countries that still don't have an open source system to set one up (GFDRR, RCMRD, etc.) and to overcome the concept of confidentiality. United Nations' recommendations on essential knowledge for planning (Table 1.4) have little consistence with the knowledge required by guidelines for local climate planning.

1.3.5 Planning

UN-Habitat and UNISDR recommend emergency, risk reduction, land use and master plans, and building codes. Climate measures are expected to be mainstreamed in comprehensive, general or master plans and in zoning maps and development code quite common in large tropical cities but rare in medium-size cities and towns. These human settlements currently house 2/3 of the urban population of the Tropics and mainly use municipal development and emergency plans (Table 1.5). These plans still have a low quality if we consider the climatic characterisation, number, quantification, importance, potential impact, cost of measures, identification of sources of financing, the clear identification of a responsible of execution, the existence of a monitoring and evaluation device and the organisation

Table 1.3 Open access information on local risk and vulnerability

Country	Zone	Information	Hazard	Scale	Provider	www	Year
AUS	Northern Territory	Prone area	F	1:20,000	NT Gov.	https://denr.nt.gov.au	2006–…
BRA	Country	RV	FL	1:2,000	MIN		2013–14
ECU	Country	E	FLT	1:20,000	SNRiesgo	http://gestionriesgosec.maps.arcgis.com	2016
FRA	Guadelupe	R	CFL	M	Prefecture	http://pprn971guadeloupe.fr	2012
	Martinique	E	F		Prefecture	www.martinique.developpement-durable.gouv.fr/carto-graphie-des-risques-sur-les-territoires-a-a572.html	…
	Réunion	H	F	1:5,000	Prefecture	www.reunion.gouv.fr/politiques-publiques-r2.html	…
	Guyane	E	F	1:100,000	MEDD	http://cartelie.application.developpement-durable.gouv.fr	2009
HND	Country	RV	F	M	CIDBIMENA	http://cidbimena.desastres.hn	2016
MEX	Country	V	CC	M	INECC	www.sicc.amarellodev.com	2013
MLW	National	HV		Di, TA	RCMRD	http://tools.rcmrd/vulnerabilitytool/	2015
NIC	Country				Marena	www.sinia.net.ni	various
PER	Country and some regions	R	F	1:220,000	MinAm SINIA	geoservidor.minam.gob.pe	2015
PHL	National	H	F	1:50,000	Geoportal	www.geoportal.gov.ph	unk
SAL	Country	R	D	M	MMARN	www.snet.gob.sv	2003–07
USA	CA	R	FT	Lo	CalOES	http://myhazards.caloes.ca.gov	unk
	AZ, CA, TX	E	F		FEEMA		unk

C Cyclon, *D* Damage, *E* Exposure, *Di* District, *F* Flood, *L* Landslide, *Lo* Locality, *M* Municipal, *R* Risk, *T* Tsunami, *V* Vulnerability

Table 1.4 Knowledge desired according to international recommendations (left) and real according to climate plan national guidelines (right)

Desired knowledge	Rank	Freq	Required knowledge
Potential impacts of CC	1	3	CC impact
R information and maps dissemination	2	2	R and H maps
	2	2	Population in high R zones
	2	2	Receptors id.
	3	1	Climate characterization
D, E, H, R, V assessment	3	1	H index
	3	1	Meteo stations linked with EWS
	3	1	R scenario
	3	1	R index
	3	1	V index
	3	1	V priority
Disaster losses record and share	0	0	
H-E, V, R, D information open access	0	0	
DRM capacity assessment	0	0	

Sources ADNE (2009), CEMA (2012), CMC (1992), Estado (2016), Gobierno (2015), Local (2014), RC (2012), RN –, RG (2014), RM (2014), SFRPC (2015)

Table 1.5 Plans categories according to international agenda (left) and reality (right)

Vision	Real	
Category	Category	Frequence %
	Municipal/Integrated development	45
Land use and Building codes Spatial development planning	Comprehensive, General, Master	14
Emergency	Emergency	12
Disaster risk reduction	Risk reduction	7
	Mitigation	6
	Sustainable	5
	Adaptation	3
	Smart city	4
	Other	3
	Resilience	2

of measures according to a time table (Tiepolo 2017). Large cities on the other hand, have sufficient resources to be able to implement a stand-alone plan (mitigation, adaptation, sustainable plan) with a zoning map and admitted land uses for every area.

The recommendations of the United Nations indicate seven measures: tree planting, pedestrian streets, resettlement, low-carbon urban form, risk transfer, disaster resistant critical facilities and increased resilience of vulnerable/informal areas (Table 1.6). In the 366 plans in force in the medium-large cities consulted,

Table 1.6 Measures according the international agenda (left) and foreseen by 271 climate plans (right)

Vision	Real		
Measure	Rank	Freq	Measure
Trees planting	1	109	Tree planting
Design streets for pedestrians	4	67	Pedestrian and cycle mobility
Resettlement	6	44	Resettlement
Low-carbon urban form	8	32	Compact city
Risk transfer and insurance	38	9	Insurance
Disaster resilient critical facilities/infrastructure	20–99	20–2	Civil protection, fire department, evacuation centers/sites/paths, water pumps, emergency tools, risk management office, water reservoir
Increasing resilience vulnerable/informal areas	55	6	Vulnerable communities information

only four of these recommended measures figure among the eight most frequently implemented: tree planting, pedestrian streets, resettlement and low carbon urban form. Insurance is in 38th place. The resilience of critical facilities (agriculture and food, water, public health, emergency services, industries, telecommunications, energy, transportation, banking, chemicals and hazardous materials, postal and shipping) (ADPC 2015: 15) in civil protection strengthening, fire department, evacuation sites, cereal banks, pumping water, emergency evacuation centre, emergency tools and rescue services, evacuation paths, risk management office, water tanks, occupy between twentieth and ninety-ninth place, depending on the measure. Lastly, the resilience of vulnerable communities is in 55th place.

The expected impact of these measures is little known. Some of them are not successful in every context. This is the case of the compact (low carbon) urban form, which is not advisable where densities are already high (Tiepolo and Braccio 2017).

1.4 Discussion

This chapter compares the resolutions and recommendations of the United Nations relating to climate planning with the state and trend of human settlements and with climatic planning in the Tropics, to understand how international orientations are compatible with reality.

It has emerged that the 11th Sustainable development goal, not being quantified, will require at least the same progress as in the last seven years to reach 2030 with

47% of cities equipped with a climate plan. This goal won't be easy to reach because countries with more experience and resources (OECD, BRICS) have almost completed (62–79%) their local planning, while 67% of cities without a plan are in DCs and LDCs.

The first obstacle lies in the lack of urban climate planning experience in half of the cities that lack a climate plan today. The second obstacle lies in the lack of access to essential information to assess damage, hazard, exposure, vulnerability and risk, since open access systems that allow knowledge of hazards, risks and vulnerability are operational in few tropical countries only. The third obstacle is dual. Firstly, tropical medium-size cities and towns do not use planning tools with zoning maps and building codes to include the climatic measures according to the recommendations of the United Nations. Secondly, the seven climate measures recommended by the United Nations are, with just one exception, quite uncommon.

This general framework shadows the considerable effort made by certain countries: Colombia, with its risk management municipal plans, Mexico with its municipal climate action plans, the USA with its climate action plans, India with the smart city program, South Africa with risk reduction plans and integrated development plans, to mention just a few examples. But best practices in a few dozen cities are not yet able to generate a propulsive effect on the remaining 1388 tropical large and medium size cities.

We have found that the recommendations regarding the implementation of the SDGs do not raise the matter of climate planning quality. We find this to be an important aspect. Significantly increasing the number of plans isn't enough. Quality of these plans matter. This aspect should be considered in 11th SDG monitoring.

We can see four possible solutions. First, hazard assessment. Hazard assessment is not in particular demand from the national guides to local planning. Planning is rarely consequent to climate characterisation. The definition of climate measures does not consider that drought-prone locations are increasingly being flooded and will be so more and more in the future (e.g. Niger) and that wet areas also suffer droughts which have catastrophic effects on farming and human needs (e.g. Paraguay, Haiti).

Second, inclusion of the concept of potential impact on the planning process. The process of prioritisation of the measures is based on potential impact only in mitigation plans. Adaptation plans do not base the prioritisation of measures on potential impacts. A device that estimates potential impacts, consequently selects climate measures and priorities, and monitors the results achieved, communicating them to stakeholders to adjust the aim and make them accessible open source, would seem to be helpful. The analytical part, that aimed at ascertaining the risk level for example, is made up of exclusively participative methods which originate in the participated rural appraisal introduced by Chambers (1992), the best qualities of which were the involvement/mobilisation of local communities and the identification of measures compatible with weak local capacities. If, twentyfive years ago, remote rural areas offered few alternatives to indigenous knowledge skills, this have long since changed: villages have become towns, administrative decentralisation has now been consolidated almost everywhere, basic infrastructures (water, sewers) are often present, high resolution daily precipitation gridded datasets and Google

earth images are now available open source throughout the Tropics and for a series of years sufficiently long as to allow the appreciation of broad scale climate trends and their impacts. What is limiting, particularly in LDCs, is the capacity to access and use this information outside the capital city.

Third, access to open source information for analysis. We should switch from occasional assessments to the open source tracking systems of vulnerability and risk, local needs and action, to address national resources and those of official development aid towards the communities most vulnerable to CC and coordinate operations among the myriad of development partners, avoiding repetitions. This information cannot be produced locally with acceptable costs and standards. But it can be produced by central or intermediate bodies and made open access.

Fourth, integrate scientific-technical and local knowledge. The effort required is dual. On one hand, simplifying and contextualising the former in order to make it easier to be used locally. On the other, fostering learning for adaptation and mitigation among rural people (Nyong et al. 2007). Reference is made to so-called climate services: meaning climate information targeted to assist decision-making. This type of information has to be based on scientifically credible climatic information and expertise but requires local knowledge of user needs and mutual engagement between users and providers in order to be effective (WMO 2011).

Among the limitations and weaknesses of this chapter, the first thing that should be mentioned is the state of planning in towns (less than 0.1 million inhabitants) which, on a global scale, contain 43% of the urban population.

As regards the implications of our findings, we show that mainstreaming, as recommended by the United Nations, cannot take place in medium size cities and towns because this category of human settlements rarely uses physical planning tools. A revolution in the local diagnosis is necessary, switching to the use of open access information, collected using a tracking process, integrated with local knowledge and standardized. This will increase the relevance of the plans as well as their quality.

The recommendations for further research are to extend the diagnosis to towns (rural world) and make it permanent. Another important area of research for the future will be the better understanding of the urban-rural relationship, its evolution and management under climate change. The interconnections between rural and urban areas are complex on a series of interlinked plans: migration, pollution, food supply. Many strategic decisions which significantly affect rural communities could not be subject to the jurisdiction of local governments, and vice versa, the planning of neighbouring or peri-urban rural areas could influence both the risk and the quality of life of urban populations.

1.5 Conclusions

This chapter highlights a paradoxical situation related to climate planning in the Tropics: we are in the presence of prescriptions (11th United Nations SDG and recommendations) without diagnosis (state and trend of human settlements, of local climate change and climate planning).

We have investigated the relevance of the challenge: much greater than it might seem, due to the tropical urbanisation, which will add 213 new medium-size cities in the next 14 years. And then the fact that mostly of the cities that will have to have climate plans are in DCs and in LDCs, which often have no climate planning at all.

A gap still exists between the vision of the United Nations and the real state of climate planning today: cities and towns need to adopt climate plans at a pace of the past seven years, but not the plans produced so far, and not using the measures envisaged up to now, leaving the job to LDCs because the member countries of the OECD and BRICS have already done the job.

Climate planning recommendations regard the analysis and the planning process (categories of plans, measures). The mainstreaming of these recommendations encounters three obstacles today.

First, the local knowledge of hazards, exposures, damage, vulnerability, and risk is absent or occasional, and is not freely accessible in most (70%) of the 41 tropical countries observed. The tracking of these last elements and their free accessibility is essential to extend climate planning, to reduce costs, considering the range of intervenants (multi-bilateral development aid, coalitions of local governments, central and intermediate governments, NGOs, etc.) and to produce information which is really helpful to the local government. In some cases (Malawi), the albeit commendable initiative is practiced without taking into account these two aspects: too many indicators to produce the vulnerability index, and an excessively rough geographic definition to be useful at local level. Second, the physical plans on which the mainstreaming recommended by the United Nations focuses are rare in tropical small-medium settlements, DCs and, particularly, in LDCs. Third, the measures recommended aren't successful in all tropical contexts.

Mainstreaming UN recommendations on local scale requires to fill different cognitive and procedural gaps, despite the fact that, in recent years, knowledge of climate planning has been strengthened.

Analysis. Knowledge of relevant climate trends for urban and rural sectors (agriculture) in contexts which don't have a network of weather stations on the ground or a sufficiently long series of records, vulnerability to climate change assessment in contests lacking information on a local scale and, transition to open access vulnerability tracking, early warning systems.

Planning process. Assessment of the quality of climate plans, estimate of the potential of the risk reduction measures, risk reduction methods, backcasting.

Measures. Risk transfer, fuel for cooking, adaptation and adaptation credits.

The 18 chapters that follow tackle these matters.

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