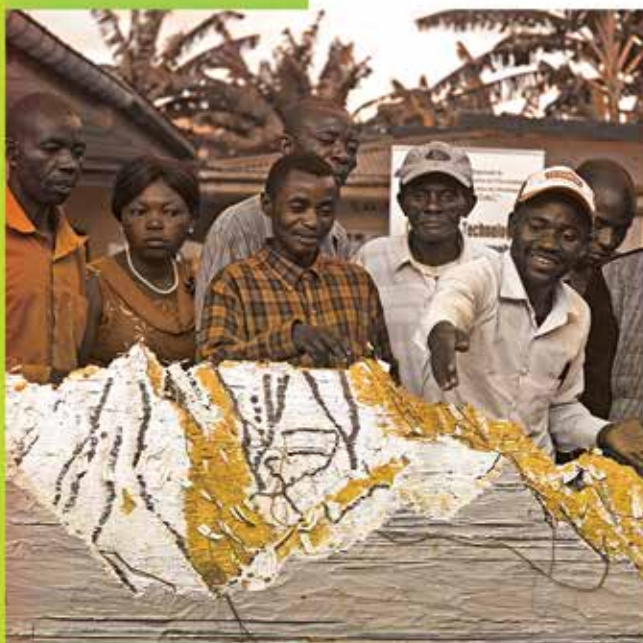


# 3-D MAPPING: A PLANNING AND MANAGEMENT TOOL FOR THE ITOMBWE NATURE RESERVE

GREEN BOOK ON PARTICIPATORY  
3-D MODELLING



Norad



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DE MONACO

## FOREWORD

*The maps presented here are the result of the 3-D participatory mapping exercise conducted in Mwenga with the Ilibo, Kigogo, and Kitamba communities. The data featured has been voluntarily placed by these three communities on the model. Although all community activities were discussed during the development of the legend, not all were necessarily included on the model. The presence of activities undertaken by other neighbouring communities in this same area, or of activities known as “sensitive” and that the community did not wish to share, thus do not figure in the model. It seems that the communities did not place selected sensitive activities such as locations for hunting, fishing, or charcoal making, for fear of reprisal by the ICCN. Gaining an exhaustive vision of local territorial dynamics in and around the Itombwe Nature Reserve would require thorough long-term work carried out with the full trust of the community.*

## CREDITS

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The pilot exercise documented in the following pages was conducted with the support of Africapacity and, in particular, the invaluable assistance of Jean de Dieu Wasso Milenge (Coordinator), Serge Milenge (Technical Assistant) and Joseph Twambe (GIS Cartographer). It is thanks to their determination and unfaltering support of the local communities and indigenous peoples involved that the results presented here could be achieved. Africapacity's work is supported by the Rainforest Foundation Norway, which has been involved in the Itombwe process since 2008.

Finally, this 3-Dimensional mapping exercise could not have been possible without the technical expertise of IRDAC, and in particular Barthélémy Boika (Expert-Cartographer), who has contributed to the project his knowledge of 3-Dimensional modelling methodology and participatory mapping.



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## INTRODUCTION

The process underway for the establishment of the Itombwe Nature Reserve in the Democratic Republic of Congo constitutes a pioneering approach to forest conservation: an approach based on the rights of local communities and indigenous peoples.

Following eight years of work under the auspices of a Joint Framework, a process in which local communities and indigenous peoples negotiated and defined the Reserve's external borders using a participatory mapping tool, a provincial decree was signed in June 2016 by the Governor. The decree

re-established the Itombwe Nature Reserve according to consensual decisions made by involved local and international actors. Today, thanks to these new community-defined borders, the Reserve is entering its most crucial and innovative phase: the effective implementation phase. A participatory zoning exercise of the Reserve is to be conducted with local communities and indigenous peoples to define internal borders and management models for each zone.

It is this phase that is likely to make Itombwe a true participatory model of nature conservation



as it becomes the first example of a protected area defined on the basis of the rights of local communities and indigenous peoples in the Democratic Republic of Congo.

In this spirit, participatory approaches already integrated by the Joint Framework need to be reinforced and complementary tools developed. It is within this context that Rainforest Foundation Norway and its partner Africapacity, supported by the technical expertise of IRDAC, launched a pilot exercise on participatory 3-D mapping. This innovative participatory mapping approach is based on the creation by local communities and indigenous peoples of a model representing their territory and activities. The pilot exercise offers a new perspective on the collection of information necessary to ensure that the management model of the Reserve takes into account the rights and activities of the populations living in the area. In doing so, this new approach to mapping also fosters the participatory monitoring of biodiversity.

The present Green Book introduces the pilot exercise conducted in Mwenga in May 2016 in the communities of Ilibo, Kigogo, and Kitamba, considering the potential of such a tool for the next stages of the Itombwe Nature Reserve's effective implementation. The study examines the preliminary steps of the mapping analysis of the existing territorial dynamic in and around the Reserve. It is our view that such steps must continue to be taken into account when conducting the internal zoning process. Along with the future definition of the management model for the Reserve, such an approach constitutes the essential conditions for ensuring the sustainable and equitable protection of the Itombwe rainforests.

# I - THE ITOMBWE NATURE RESERVE: FROM CONFLICTUAL CREATION TO A PARTICIPATORY APPROACH TO CONSERVATION

## 1. PRESERVING THE ITOMBWE RAINFOREST: A PRIORITY FOR ALL

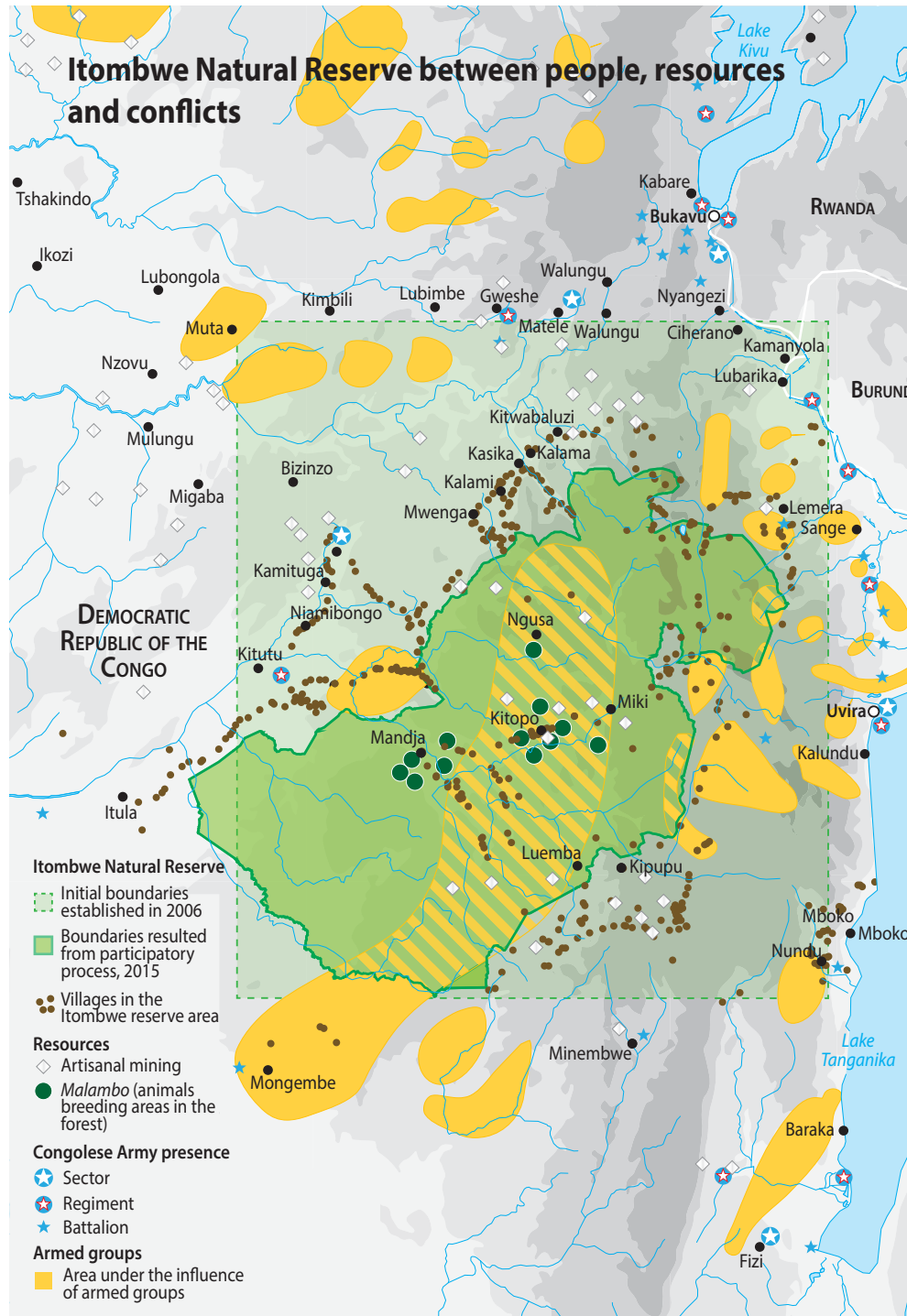
The Democratic Republic of Congo's rainforest, located in the heart of the Congo basin, represents 10% of global tropical rainforests. This rich biodiversity is also intimately linked to significant cultural diversity; local communities and indigenous Pygmy peoples have cohabited with mountain gorillas and antelopes for thousands of years in the Itombwe rainforests in the South-Kivu region. But change is rapidly occurring in the area. Over the past decades, economic development, increasing international demand for natural resources and serious conflicts and humanitarian crises have threatened local populations, as well as the forest resources upon which they depend for their survival. In response, the government of the Democratic Republic of Congo, supported by its international partners, has launched a series of conservation initiatives across the country, with a goal of designating 17% of territory as a Protected Area before 2020.

From the colonial period, and increasingly in the 1990s, local communities and indigenous peoples of Itombwe have seen researchers come to the region

to inventory its natural heritage assets. When these researchers came to the conclusion that these forests needed to be protected, the Congolese government in October 2006 announced the creation of the Itombwe Nature Reserve, established through a ministerial decree whose content surprised all local stakeholders. This decree established a reserve spanning 15,000 square kilometres (km<sup>2</sup>) covering a vast quadrilateral, extending even beyond the borders of the country. The objective of such a decree, signed in haste, was to protect the rainforest from being allocated for other uses, including concessions such as those for logging or mining, and the creation of new political territories. With the support of civil society organisations, however, local communities strongly objected to this project. They felt that the creation of a reserve would threaten their way of life, and feared that they would be expelled and unable to exercise their right to practice traditional activities. Local communities and indigenous peoples thus barred conservation actors from setting foot on their land, and their protests quickly



# Itombwe Natural Reserve between people, resources and conflicts



gained such a powerful momentum that the reserve could not be established.

In 2008, following several consultations with the affected communities, and eager to find a compromise, the Congolese Institute for Nature Conservation (ICCN) – responsible for the management of protected areas in the country under the framework of the Ministry of Environment, with its partners the World Wildlife Fund (WWF) and the Wildlife Conservation Society (WCS) – organised a consultation meeting. They gathered together the affected actors of Itombwe: representatives of the conservation and

civil society sectors, as well as local communities and indigenous peoples. In spite of divergences, all the involved parties agreed on the need to preserve this zone and to protect it from external interests likely to destroy the resources it harbours. A work plan was defined, which aimed to establish the protected area within the zone under the following conditions: (1) its borders would be redefined in a participatory manner, (2) an internal zoning process taking the needs of local communities into account would be conducted, and (3) a community-based management model would be developed in the long term.



## 2. THE JOINT FRAMEWORK: A MULTI-ACTOR COLLABORATION PLATFORM

In order to carry out this work, an innovative informal discussion framework was established, bringing together the ICCN, the WWF, the WCS, and Africapacity as a representative of civil society and local communities and indigenous peoples. On the basis of this work plan, these organisations have, since 2008, been carrying out joint consultation activities with the communities, planning and jointly implementing activities that are directly linked to the jointly defined objectives. Each member of the Joint Framework carries out its specific activities related to its own core expertise. For instance, the WCS conducts biodiversity inventories, the WWF and the ICCN train rangers, while Africapacity sets up community projects and participatory studies. For the first time in the Democratic Republic of Congo, these organisations are now meeting regularly to discuss the methodologies used, as well as the implementation and scheduling of these activities, and to share key findings with all actors involved.

From 2008 to 2014, the Joint Framework endeavoured to support the local communities and indigenous peoples in redefining the external borders of the Itombwe Nature Reserve. The Framework has organised numerous field visits and village gatherings in order to train cartographers within the communities, as well as proposing various scenarios in order to be able to table a new decree setting borders established in discussion with indigenous and local peoples. Two of the consulted communities

living in the south of the current Reserve, both of which had expressed reservations about their land being integrated with the Itombwe Nature Reserve, have been kept informed of the process, but their right to self-exclusion has been respected.

The Joint Framework thus made it possible for trust to be built between actors who had previously considered themselves antagonists. In this respect, it sets out a new collaborative and participatory approach to environmental governance, promising an alternative future for conservation and development in Central Africa far removed from traditional policing and conflictual approaches.



### 3. FROM DEFINING THE LIMITS OF THE ITOMBWE NATURE RESERVE TO ITS MANAGEMENT

The first phase of work is now complete. Indigenous peoples and local communities, along with members of the Joint Framework, unanimously approved a decree that was subsequently submitted to the government in 2014. The decree redefines the external boundaries of the Itombwe Nature Reserve on the basis of participatory mapping exercises and of the voluntary choices made by the communities to integrate their traditional lands into the Itombwe Nature Reserve, which now covers a surface area of 5,732 km<sup>2</sup>. The decree was signed at the provincial level in June 2016, to the great satisfaction of the members of the Joint Framework and the communities of

Itombwe. On this basis, the Prime Minister will sign a decree, which will be key to the full recognition of the new boundaries and to providing the necessary conditions for the next steps of the process. With the legalities in place, the new Itombwe Nature Reserve will in the coming months be able to work in a participatory manner on its internal zoning and on the management models for the various zones. Three zones are envisaged: the integral conservation zone, an “intermediate” or “buffer” zone, and a multi-purpose zone. The exact boundaries, and especially the involvement of communities in the management of each of these three zones, remain to be



defined. The following questions will also need to be addressed: Which activities will be undertaken in each zone? What roles will be allotted to the ICCN, the community governance authorities, and to conservation actors in each of the zones? Which conservation and development projects will be set up within the Itombwe Nature Reserve? What financial resources can be channelled into the Reserve and how will the potential benefits be shared?

Following the signature of the provincial decree and dovetailing with the efforts of the Joint-Framework since 2008, work is being done to define a participatory approach to addressing the questions outlined above. This encompasses calling on the communities to take stock of their visions, knowledge and particular needs.

Although the new decree fails to mention this aspect of community-based management or co-management of the Reserve, it is worth pointing out the initial commitments made by the Joint Framework regarding the community dimension of the Itombwe Nature Reserve, as well as the participative zoning process in which communities define the internal boundaries of each zone along with a management model.

The present Green Book, which examines the pilot project carried out in May 2016 in the Mwenga territory, proposes the participatory 3-D management model tool as a consultation and decision-making method to be used for the following stages of internal definition and establishing management models for each zone of the Itombwe Nature Reserve.





## II. BASICS OF PARTICIPATORY 3-D MAPPING

### 1. PARTICIPATORY APPROACHES AND FREE, PRIOR AND INFORMED CONSENT

One of the guiding principles of participatory approaches is that of free, prior and informed consent (FPIC). FPIC is a process used to define and regulate the relations between parties; it is applied in the medical context or that of social protection work, and in the case of Itombwe, in natural resource management. Within the framework of forest management, FPIC allows local communities and indigenous peoples to receive sufficient information, prior to the commencement of envisaged projects, in order to be able to freely decide to assent or not to activities that impact their territories and resources. Such an approach guarantees the sustainability of a given project, laying the groundwork for open, equitable and long-term relationships between forest peoples and external actors. In this way, it establishes the relationships necessary to ensure sustainable local socio-economic development. The voluntary involvement of all stakeholders and their representatives (men, women, youth, elders, various clans, hunters, trackers, farmers, chiefs, etc.) helps ensure that the entire community participates in the process and helps to legitimise it. This approach was adopted for all of the activities undertaken by the

Joint Framework in Itombwe.

Participatory approaches, which thus constitute a set of tools enabling the active and responsible involvement of local populations and communities, evolved from the recognition that the one-way intervention strategies that prevailed in the past had failed. Such approaches speak to the more recent desire of development and conservation organisations to integrate the community dimension in various projects carried out on the ground. This approach rests on pre-existing dynamics within communities, where decision-making in certain cases takes place on the basis of reaching a community consensus following long discussions. It thus enables the anchoring of projects at a grassroots level and offers a series of advantages. These include linking the project to real community needs, ensuring the ownership of the project by its key actors and offering better results, both in terms of biodiversity – actors feel part of the project and thus contribute to protecting biodiversity – and the well-being of local communities, who are included in a process that might otherwise neglect their needs.



## 2. MENTAL MAPS AND TRADITIONAL KNOWLEDGE

Mapping and mapping tools, which consist of coordinates, geographical information systems (GIS), databases and software, enable the collection of standardised information (rivers, mountains, inventoried industrial concessions, deforestation rates, etc.). They cannot, however, fully convey the specificity of the geographic sites involved: their meaning, use and

heterogeneity. Nevertheless, the latter remain characteristics of primary importance when one wishes to understand a territory in order to manage it in the most equitable and sustainable way possible.

In the case of the Itombwe Nature Reserve, it is precisely these traditions and customs, as well as the knowledge of indigenous





peoples and local communities – in other words, the cultural relevance of elements of the forest – which must be mapped. A satellite or team of technicians which comes from the outside – and the use of automated technology more broadly – can generate a great quantity of data. But such approaches cannot contribute to our understanding of the particular importance of a given valley, river, spring or tree for a community that lives in and depends upon the forest.

This raises the question of how best to transfer the vision emanating from local culture and knowledge onto a map. The organisation of consultations, the adoption of participatory approaches, as well as the ownership of the mapping tools by the inhabitants of the territory produces an invaluable wealth of information. Such knowledge makes a deeper understanding of the complexity of Itombwe possible, encompassing questions such as: Which are the sites where animals reproduce? Which are the holy forests essential to the cultural activities of the communities? Which rivers are rich in fishing resources? Which caterpillar trees feed the communities? When drafting a development plan, where would it be more judicious to establish a health centre accessible to a great number of community members?

By answering these questions, communities share their incomparable knowledge of the territory – a process also called “mental mapping” – via their traditional customs and geographical teachings perpetuated within the community. In addition to unearthing unknown or invisible territorial information, such as the boundaries of clans, springs,

or sites of sacred rites, one of the key advantages of participatory mapping is that it helps to facilitate a sense of ownership with respect to the process of establishing and implementing reserve projects. The process of setting up the Itombwe Nature Reserve has since 2008 proceeded on this basis, and it has thus guaranteed a certain form of social peace within the framework of its development, which benefits all.

The methodology of this process aims at allowing local communities and indigenous peoples to represent their territories and determine the latter’s use, and thus to integrate their priorities and concerns in planning and management. It is a question of identifying the communities’ traditional territorial rights with respect to a given territory, of better understanding their use of it and of resolving conflict at the local level. As traditional knowledge and needs cannot be made visible by technology alone, or by a computerised interpretation of space, locating them on the map in collaboration with local populations allows decision-makers to fully grasp the specificity and importance of particular sites for those who inhabit them, and consequently to make the most appropriate decisions regarding the management of this space.

### 3. 3-D MAPPING: A NEW COMMUNICATION TOOL

With this same objective, 3-D mapping offers new prospects aimed at facilitating the on-going process, while taking it a step further. The process used to transfer traditional indigenous knowledge to a map usually relies on technology. Indigenous and local communities are trained to use GPS and to chart geographical co-ordinates, and the information is collected, worked out and visualised by a qualified operator. As the Itombwe pilot exercise strikingly demonstrates, mapping in 3-D facilitates this transfer of information onto the map.

3-D mapping provides a visual representation on the scale of a dwarfed natural environment. Through the contours of its landforms it gives communities immediate cognitive reference marks. The advantage of the 3-D approach pertains first and foremost to its ability to mobilise participants in this way, as the model arouses people's curiosity and presents a learning interest for all. As it involves the indigenous and local communities in the construction of the model itself, all the way through to its presentation, this approach allows them to create a final and physical product without any external intervention. This differs significantly from 2-D mapping, for which Itombwe communities would have to entrust the co-ordinates they have determined to a map made by a GIS technician based in Bukavu. Moreover, by doing away with the technological aspect of GPS and the complexity of 2-D representation, 3-D participatory mapping places the various

interlocutors and facilitators on the same level of understanding and perception of the territory. Consequently, this approach facilitates communication and the reaching of consensus in decisions relating to sustainable management, which can be made based upon the mapping exercise. Finally, the process legitimises the decisions made and makes them sustainable, owing to the fact that it allows an ownership of the process not only by the "elite" of the trained community cartographers, but also by all members of the community, including the youth and the elders, both men and women. Through the exercise, elders have the opportunity to transfer knowledge to the younger generation and to perpetuate lessons of the past, while all community members can be proud of having contributed to the creation of the map.

From a practical point of view, the 3-D mapping process enables significant time saving and presents several logistical advantages. The Mwenga pilot exercise, which extended to cover an area of 20,000 hectares, included about 100 people, representing the communities of two chieftaincies (the Lwindi and Basile) and three key sites (Kitamba, Kigogo and Irangi). It took place over two weeks, following a two-week preparatory mission in the villages a month before the exercise. The data gathered by the communities (without training) and entered into the model over the two working weeks of the mapping process represents a vast





quantity of data. It is worth comparing this with a traditional 2-D participatory mapping method, for which each point must be manually taken by cartographers trained in GPS use and planimetric representation, which entails physically covering kilometres to reach each point. Gathering the communities in a central place limits the travelling required for the team and its equipment, making the logistics of the exercise considerably more manageable.

Finally, the fact that this process leads to an immediate result in terms of a finalised map, without any need to call on a GIS laboratory, means that there is no need to validate the end result, as is typically required in a 2-D participatory mapping process. To be sure, each and every

iteration of a given map risks a partial loss or distortion of information. This is why the validation of the map is an essential final stage of a participatory mapping exercise: the communities must be able to see the finalised map, comment on it and make any modification that might be required (for example, the omission of a key element or an incorrect GPS co-ordinate). While with 2-D mapping a validation mission has to be carried out following the creation of the map in a laboratory, with 3-D mapping communities retain a global vision of the map's creation throughout the exercise. Validation and correction are thus made on an on-going basis, and then in a natural way once the model is complete

### III. METHODOLOGY FOR 3-D MAPPING

The potential of participatory 3-D modelling to mobilise communities around an exercise focused on the management and planning of a territory should not be underestimated. The playful aspect of the exercise, the fact that it doesn't require the use of technological equipment such as GPS, and the user-friendliness of the methodology allow participants to take ownership of the model and to project their individual knowledge and vision for the community. The various stages presented here thus make it possible to set up the exercise incrementally and to invite the whole of the community to plan and manage its traditional territory and the natural resources that surround it in a participatory manner.

As in many other forest areas in Central Africa, land tenure issues are a very sensitive topic in Itombwe. The conflict-ridden history that has affected the initial creation of the reserve, as well as the lack of trust towards external actors, can make the exercise difficult since it is about sharing traditional knowledge about the area and geo-locating all the resources on which the community depends for its survival. This is why entrusting the facilitation of this exercise to local actors of civil society that have followed the process since inception is key to the latter's success.

It is essential to establish a relationship of trust before starting any participatory activity; this process rests on the quality of the facilitation, particularly if activities involve a strategic dimension. Communities must also be given a certain amount of time to reflect, question and adapt, and this is why such an exercise cannot be carried out with haste over a few days.



## 1. THE PREPARATORY MISSION

In this approach a small team travels to the villages in question in order to present the objective and the methodology of the exercise a few weeks before the desired date of the exercise, to answer the questions of the community, and to leave them time to reflect on whether or not they agree to take part in it. In the case of Itombwe, the presence of previously trained cartographers within the communities, the on-going work of the Joint Framework, the various exercises of participatory mapping carried out to define the external boundaries of the Reserve, and especially the existence of a structure that

had already been set up on the occasion of previous work through the grassroots committees, all contributed to gaining the fast approval and even some community enthusiasm for this new exercise. However, doubts and suspicions often surfaced when the community was confronted with the idea of having to share traditional knowledge on a model that would be made public. Such an exercise could serve dishonest interests aimed at monopolising the communities' resources. These misgivings were overcome thanks to thorough discussions and the communities' deep trust in Africapacity. This mission thus also represented a new stage in the sensitising process by reminding people of the commitments that were made to community conservation and the goodwill of the State in respecting this exercise and its commitment to not take over the process. This mission also identified the location for the 3-D mapping exercise, allowing the communities from all the identified flagship sites to take part in the process. In such projects, the place needs to be central, offer an appropriate work space, and be close to the place where the model would be stored. For this pilot exercise, the neighbouring city of Mwenga was selected. Following the team's visit, communities were asked to identify representatives to take part in the project, based on their knowledge of the local area, but also selected in terms of representation criteria, including gender (30% of women among the representatives), age (young people for the construction phase, but also among the delegates for depicting the information), and their social status within the community (chiefs, hunters, trackers, farmers).

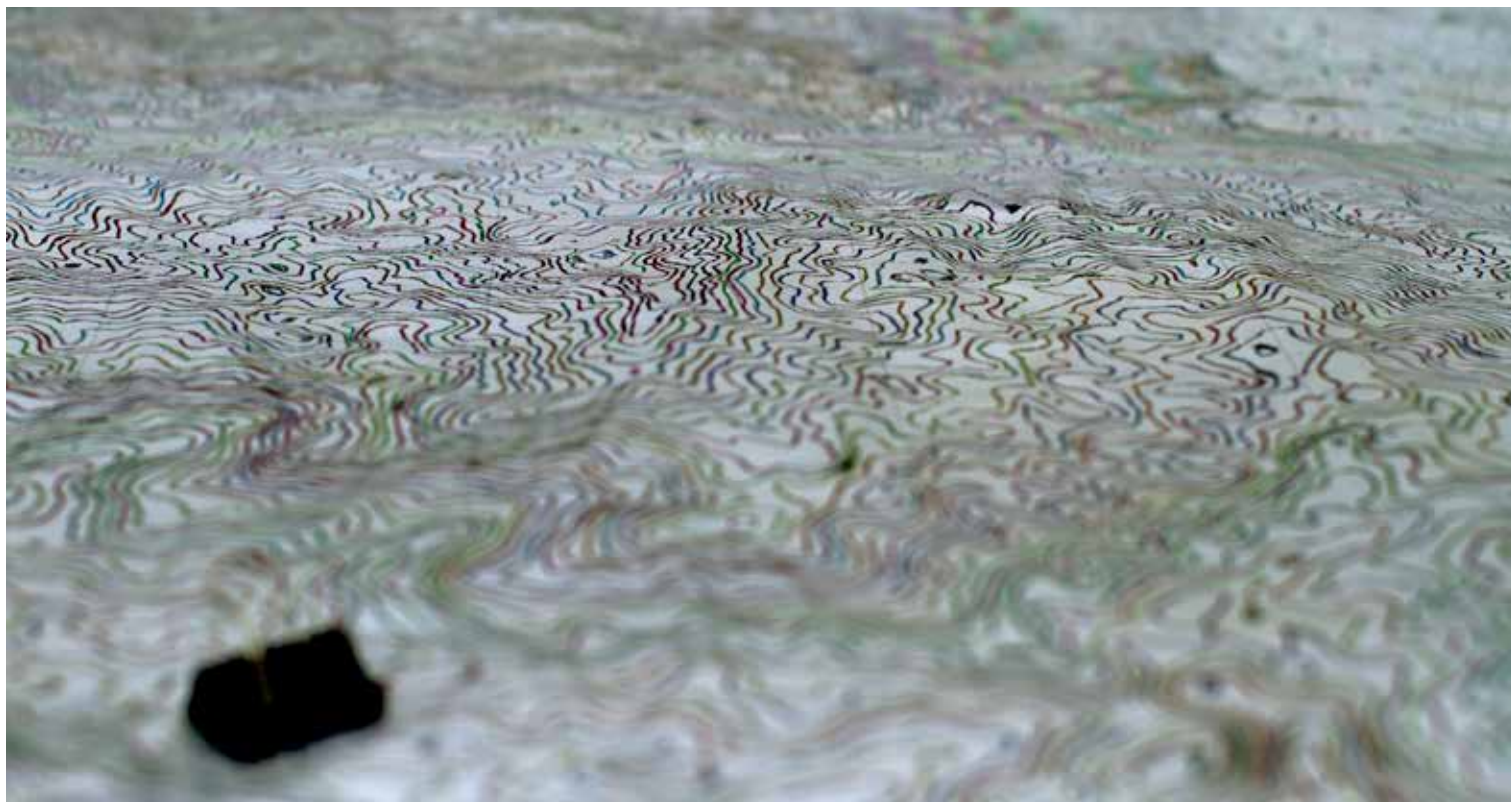




## 2. GEO-REFERENCING

Even though communities build the model, GIS technicians must still carry out preliminary work. They are responsible for gathering the geographical co-ordinates of the selected area, of identifying contour lines to later enable the communities to build a model that replicates reality. Thanks to these relief maps, communities can orient themselves once the model is built. The complementary collection of GIS data might be necessary: existing land uses superimposed on traditional territories, or results stemming from former mapping exercises. In the case of

Itombwe, the external boundaries of the Itombwe Nature Reserve as defined in the participatory process and registered in the draft decree, as well as the co-ordinates of the existing exploration concessions of the mining company BANRO, superimposed on the Reserve, were integrated by the technicians. These delimitations will however only be added onto the map at the end of the process, so as to avoid interfering with and influencing the paramount localisation work done by the communities.





### 3. SELECTION OF MATERIALS

Participatory mapping requires simple, but bulky materials, which should be purchased prior to the exercise: tables, foam, glue, paint, etc. Special attention must be given to the materials that will be used for the legend: on the basis of the preparatory mission, first elements of the contents of the map legend can be put forward: boundaries, rivers, roads, harvesting places, malambo (animal breeding sites), sacred forests, etc. A preliminary identification of the elements of the legend, which is completed later on, enables the facilitation team to know what

types of materials it should source: colours of the paints, pins, wool strings, etc. The availability of a diversity of colours and shapes will facilitate the identification of a diversity of representations on the model. The facilitation team should also favour the selection of simple and locally available materials as much as possible. For this exercise, some elements were brought from Kinshasa, and the rest purchased in Bukavu.





#### 4. ASSEMBLING THE MODEL

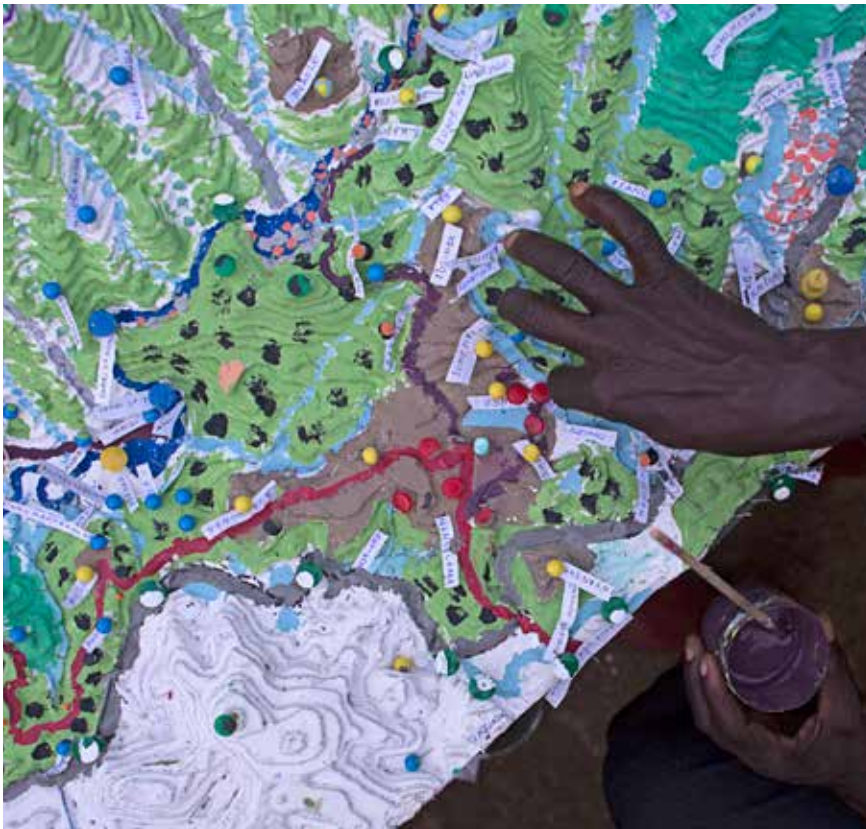
This stage offers the opportunity to involve the youth of the communities in the exercise. Even though they might have more limited territorial knowledge than the elders, they can take part in the work by getting involved with the tracing, cutting and gluing of the various layers of the model, each one representing a level of the relief. For this exercise, a horizontal scale of 1/10,000 (i.e. 1 centimetre on the map = 100 metres on the ground) was adopted, while a vertical exaggeration times

two was applied, that is to say a vertical scale of 1/5,000; i.e. 1 centimetre on the chart = 50 metres. The young people were then divided into three groups allowing for progressive tracing of 3 millimetre-wide layers of foam, each layer representing a 15 metre elevation, and then the cutting and the gluing of layers, which were done on the basis of the initial two dimensional drawing. A coat of white paint was applied to complete the preliminary, unembellished model.

## 5. DEVELOPING THE LEGEND

Once the model was built, the representatives were invited to discuss in a plenary session the data sets that they wished to represent on the model. These data sets can vary according to a given area but also to the objective of the exercise. Obviously, not all the elements of the area are retained; only those that interest the communities in priority (important places and uses for them) and that will thus be strategic to their advocacy work are kept. This legend is non-exhaustive and fully integrates the FPIC notion: the

communities know that what will be shown on this map will be made public and they are thus free to choose what they wish to put on the model or to censor data they deem too sensitive and which they do not wish to share. In the case of Itombwe, the hunting places in the Reserve were kept secret, for fear of reprisals from the ICCN. The data to be placed on the model can be clustered in polygons (areas assigned to a specific use or uses), dots (specific places) and lines (lines crossing the territory). While the communities are given the freedom to choose the representations that seem the most suitable to them, two criteria are retained to direct their choice: the practicality of the representation (a paint colour for a polygon, a pin for a dot, and a string for a line) and realism/traditional meaning of the selected colours (it will be easier to identify a forest if it is painted in green rather than in pink; cemeteries can be identified by a colour that traditionally refers to death or to spirits). The often passionate discussions emerging from the development of the legend present the unique opportunity for the communities to share the way they see the territory and how to symbolically represent it. It also presents the facilitation team with the opportunity to learn more about the traditional meaning of the various places, and about the community's symbolic system. The attention paid to this phase contributes to offering new ways of reading the work done and adding onto the model.





## 6. DEPICTING THE INFORMATION

The communities are then asked to position the various symbols on the model itself. Participants should first be given some time to orientate themselves on the blank model, so that they can get their bearings, locate their villages and then their territory,



as well as the main landmarks that they may know, such as summits or rivers. Each set of representatives spent two days on this phase, taking turns in positioning the elements on the territory that they know best; i.e. on the portion of the model around their principal sites. This phase is conducted in a relatively autonomous manner, with the presence of the facilitators and GIS technicians being needed only to answer any questions and to monitor the process. Land tenure conflicts are likely to appear at this stage, as is the case in a 2-D process, since the communities, while placing their resources on the map, can identify traditional territorial boundaries, which are sometimes debated. This participatory mapping process can hence sometimes be construed as a tool to resolve land tenure conflicts. In Itombwe, the exercise indeed allowed the communities to specify the boundaries of their traditional territories, but also to point out the boundaries of the Itombwe Nature Reserve that had been defined at the time of the participatory mapping exercises conducted previously. Although these limits had been defined in a participatory manner, the 3-D representations of the latter on their territory and their inscription on a map representing their activities allowed the communities to visualise them more clearly than a 2-D map would have allowed. Vivid discussions then followed during which people sought to better understand the work that had been done and to orient themselves with respect to the Reserve's boundaries, which had not been clear for all before this point.

## 7. COMPLEMENTARY USE OF A PHOTOGRAPHIC DRONE

Just as 3-D mapping allows for the conducting of participatory mapping exercises across extensive areas without being in the field, the use of photographic drones allows aerial photos of the territory to be taken from a fixed point. The use of such a remote-controlled photo camera within the framework of participatory mapping supplements the information transferred onto the model by collecting geo-referenced visual data that confirms the presence of villages and the geographical specificities of the territory, but also of areas that have been deforested. In the case of a 2-D mapping exercise, a drone takes geographical coordinates in inaccessible points of the territory, as it travels unhindered above rivers

and dense forests. There are however three pre-conditions to the use of a drone: (1) national and local administrative authorities need to approve its use, which can restrict its implementation over strategic zones, (2) communities need to give their assent to the use of an apparatus that might frighten them, and the drone's use must be explained, (3) the technical training required to master the use of such a device requires geographical and photographic knowledge, as well as formal and practical training on the piloting of the drone.







## 8. THE INAUGURATION OF THE MODEL

Once the model is complete, it can be presented publicly, depending on local customs and social norms. Holding such an event, which all participants attend and during which they can share their impressions, interpretations and recommendations, provides an opportunity for the communities to advocate their vision to decision-makers. To this end, it is important to target the advocacy message appropriately to make sure that it is addressed

to the right interlocutors. The model is a fantastic advocacy tool in the sense that the concerned interlocutors can themselves approach it, touch it, and discover it in a playful way. A simple object to make and to understand, the model is presented directly by the communities who explain, with the support of this visual representation, their territory, their resources and their needs.

## 9. STORAGE, REPRODUCTION AND DATA COLLECTION

A 3-D model is bulky and fragile and can therefore not be moved easily. It is moreover essential that the map itself belong to the communities, and that it is stored in a place accessible to all. In the case of Itombwe, the model was housed in the offices of the ICCN in Mwenga, where people could freely access it. One must be able to reproduce the model for zoning or regional planning purposes, or to define the management model of a given area. To this end, high-resolution photographs of the model must be taken and then digitalised. Various data extraction processes can be followed, of which two main processes are retained, according to the desired use of the data:

- GIS extraction: Data is geo-localised and entered into a GIS database via GIS software. This process is useful for locating points precisely through geographical co-ordinates, and to use them for a regional planning process. This is, for instance, the type of extraction to use when defining the internal zoning of the Reserve, so that the boundaries selected correspond precisely to those given by the communities. GIS extraction will also make it possible to make an identical copy of the model, in a reduced format if necessary, to use at advocacy meetings held outside of the area with national or international stakeholders.
- Visual extraction: This is a form of topical map aimed at eliciting the territorial dynamics of a given space and at enabling a better understanding of how this space should be managed, be it an existing or desired space. This is the type of extraction that was retained for the purpose of the present Green Book, since the intention here is to understand, from a geopolitical, economic and social point of view, the interests of the communities that will be taken into account in the future management of the Itombwe Nature Reserve.



## IV. ITOMBWE IN MAPS

### 1. WEALTH OF BIODIVERSITY KNOWN AND PROTECTED BY INDIGENOUS PEOPLES

The *Bambuti*, part of the 60,000 inhabitants living in the Itombwe Nature Reserve, have been living in these mountains for thousands of years. Although they are not officially recognised as indigenous peoples in the Democratic Republic of Congo, it is widely accepted that the *Bambuti* were the first inhabitants of the region and they are usually recognised as forming part of the Pygmies, which number about 600,000 people in the country<sup>1</sup>. Their lifestyle, traditionally nomadic or semi-nomadic, differs from that of other sedentary tribes grouped under the name Bantu.

The *Bambuti* are physically and spiritually connected to the forest, and have their own traditional forest knowledge, which they have shared on the map. But they also have their own traditional conservation methods, sometimes referred to as “traditional technologies” by the members of the community who are eager to promote their knowledge. This knowledge is essential to conservation, as it plays a part in better understanding the hidden dynamics of the forest cover, and the movements of fauna and their reproductive habits. The identification of “biodiversity hotspots” also contributes to identifying the most favourable areas to be integrated in the conservation area, as they are key to the safeguarding

of Itombwe’s fauna. It is this richness that makes this rainforest a unique place, rich in biodiversity, which must be protected.

Local communities and indigenous peoples have preserved these resources themselves until now by using traditional conservation methods that can be used as a basis for the internal rules of the Reserve. In this sense, it is judicious to make use of 3-D participatory mapping to document these traditional conservation practices and to better understand them in order to integrate them into the management of the integral zone.

In *Bambuti* culture, traditional prohibitions form a whole set of rules put in place by the guardians of customs (traditional chiefs known as *Bamis*) and imposed on members of the community. Failure to comply with such prohibitions can result in the Muzombo, a spiritual punishment, along lines of a curse, whose far-ranging consequences – such illness or even death – are greatly feared among the *Bambuti*. These traditional prohibitions include hunting in *Malambos*, the places where animals reproduce and raise their progeny, or setting traps around rivers where animals come to rest and drink; human presence is entirely forbidden in the “salinas”, places identified by the communities as “hidden places where animals come to heal”. While communities did not represent these places on this map – the portion of the selected territory

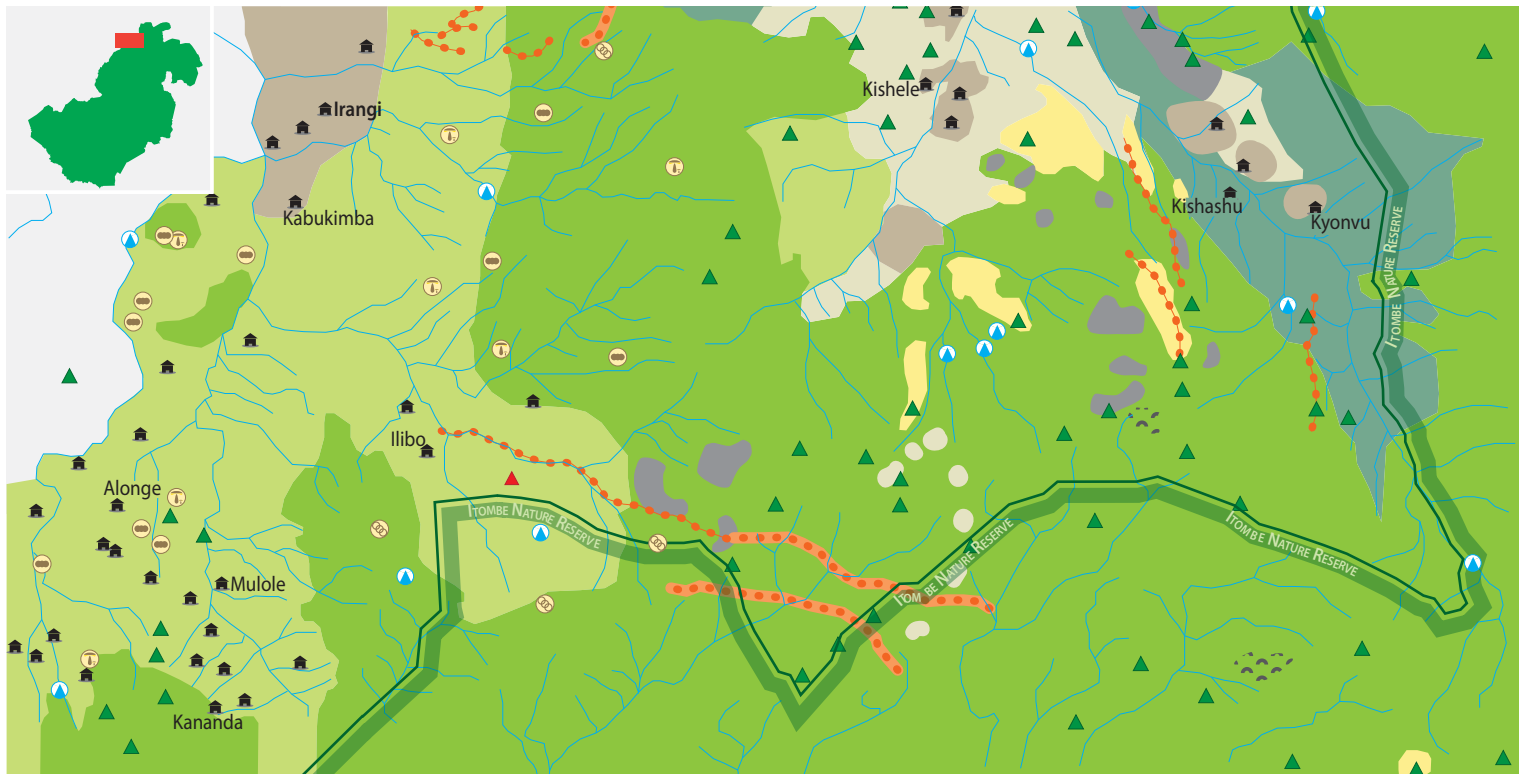
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1 Universal Periodic Review of the Democratic Republic of Congo (2014) *Indigenous peoples in the DRC: The injustice of multiple forms of discrimination*



is indeed limited and does not capture all forest activities – the development of the legend allowed the representation of all of these traditional conservation practices, which could be found in other portions of the Reserve. The communities have, for instance, also shared prohibitions relating to hunting during mammals’ gestation season, or killing certain animals, such as gorillas. These rules count as practices that have already been embraced by the

indigenous peoples and that the Reserve should legitimise by integrating into its management model, rather than replacing them by a new conservation system that would be more difficult to accept as the local inhabitants could potentially perceive this as a form of illegitimate coercion imposed from the outside



## Biodiversity and traditional knowledge

- |                    |                               |                    |                  |
|--------------------|-------------------------------|--------------------|------------------|
| 🏠 Village          | 🍄 Creepers harvest            | 🌿 Primary forest   | 🌾 Straw and bush |
| 🔺 Volcano          | 🍄 Mushrooms and pharmacopoeia | 🌿 Secondary forest | 🪨 Rocky area     |
| 🏔 Mountain or hill | 🐛 Caterpillars                | 🌿 Bambu forest     | 🏠 Village buffer |
| 💧 Waterfall        | 🔴 Piste grands mammifères     | 🌿 Savannah         | 🕒 Cave           |
|                    | 🔴 Piste petits mammifères     |                    |                  |

Source : produced from a 3D model realized by the communities of Kitamba, Irangiand Kigogo during a 3D cartography exercise in Mwenga, Mai 2016



## 2. TRADITIONAL ACTIVITIES AND THE USE OF FOREST RESOURCES

Within the framework of the Itombwe Nature Reserve, the 3-D participatory mapping exercise brought to the forefront the fundamental interdependence between forest resources and the communities that live within them. Pantry, pharmacy, spiritual haven and source of building materials: the forest constitutes the principal resource of these communities, which explains their determination to have their traditional rights recognised.

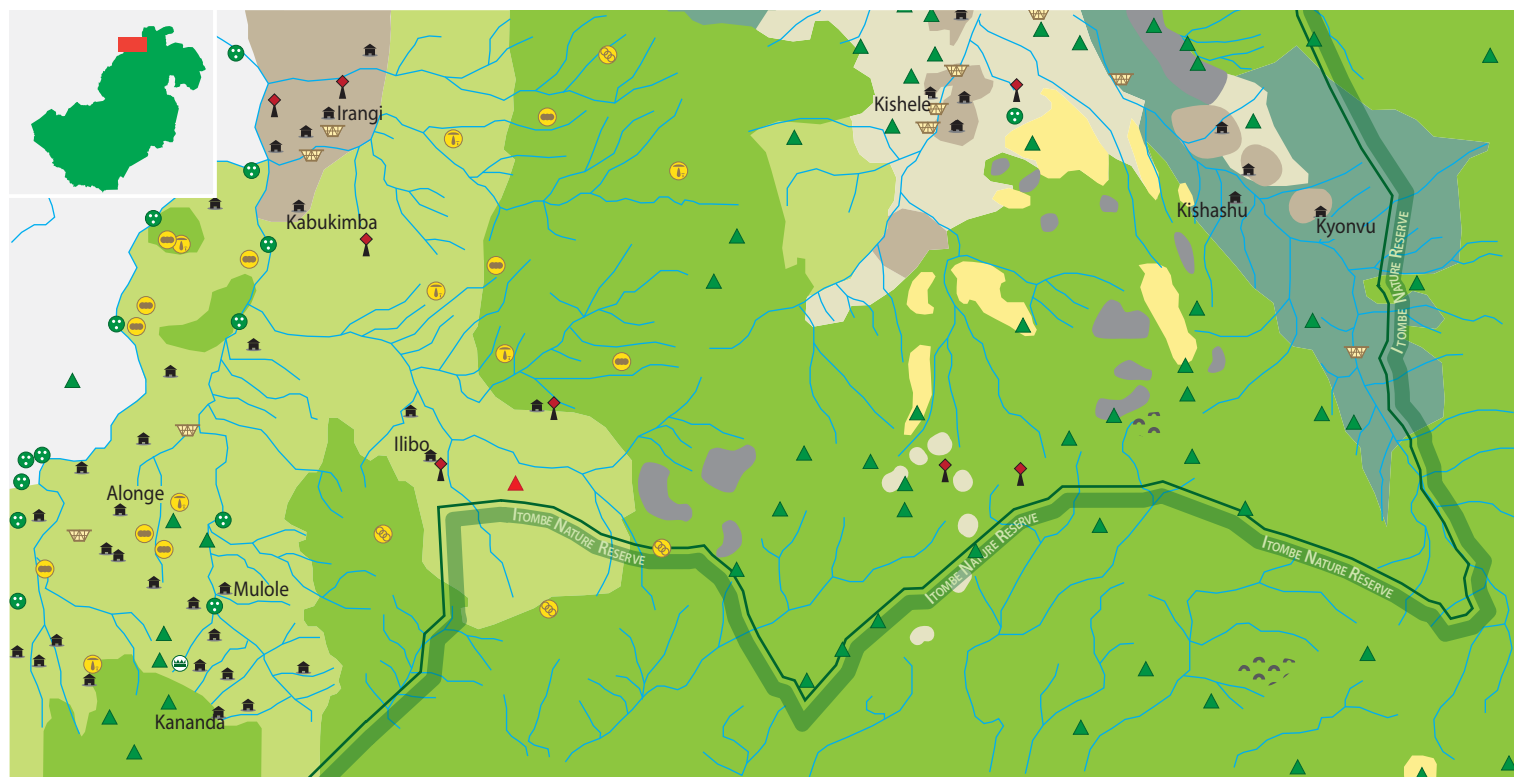
In the light of the diversity of the food resources that the forest puts at their disposal (caterpillars – called Takus, mammals, fish, honey, fruit trees, arable land for subsistence farming that mainly focuses on manioc and peanuts) the issue of food security emerges as a paramount factor in the zoning process and in the future management of the Reserve. At the time of the pilot exercise, communities also mentioned elements related to the traditional pharmacopeia, based on a series of “nutriceutical” foods (foods with medicinal properties such as specific bark, herbs or animals). These nutriceutical foods are harvested by the community and administered to the ill to cure various ailments and pains. The communities gave the example of Mbilo Mbilo, a tree-growing fruit used to fight anaemia that can only be found in certain specific places in the primary forest.

The forest moreover constitutes a source of building materials, tools and objects

usually used by the communities. Branches and lianas are used to build houses, as well as to make culinary tools and certain traditional costumes. Certain tree species are recognised by the communities as marking the delimitations to the various clans – trees serve this purpose and not rivers – while others produce barks from which clothes worn during enthronement ceremonies are made. Forest resources thus not only constitute a source of food and/or care, but they also harbour fundamental cultural characteristics, and therefore the *Bambuti*’s physical survival and the survival of their identity depends on accessing these areas.

Finally, the forest resources play a vital cultural role – deemed as perhaps the most important – for which there is no alternative. The indigenous culture, closely intertwined with the territory, comprises rituals and holy places, the access to which has to be guaranteed within the framework of the Itombwe Nature Reserve. For example, all young men take part in Lutende, the initiation ritual that lasts several months and that takes place in forests dedicated to this ritual. Although what happens during such initiations is shrouded in secrecy, all agree that they constitute a key step in perpetuating traditional knowledge and in safeguarding local culture. The presence and diversity of the places of worship, cemeteries and places of spiritual significance – such as the holy cemeteries of the *Bamis*, where power is handed over to successors – could also

be highlighted during the mapping exercise, as communities were free to draw up the legend and thus emphasise the importance of this category to them. For example, they underlined and placed on the map many sites of invocation for fishing or hunting, which are essential spaces to obtain the spiritual agreement required for the practice of these traditional activities.



## Traditional activities and natural resources use

### Cultural practices

- Site for traditional enthronement
- Site for rituals for invocation (hunting, fishing and others)
- Traditional cemetery

### Traditional practices

- Creepers harvest
- Mushrooms and pharmacopoeia
- Caterpillars
- Bridge made of creepers

- Hill or mountain
- Volcano
- Primary forest
- Secondary forest
- Bambu forest
- Savannah
- Straw and bush
- Rocky area
- Village buffer
- Cave

Source : produced from a 3D model realized by the communities of Kitamba, Irangandi Kigogo during a 3D cartography exercise in Mwenga, Mai 2016

### 3. THREATS AND DISPLACEMENTS OF POPULATIONS

The Itombwe forest's fauna and flora are highly threatened, but so are its inhabitants, and the participatory establishment of the Itombwe Nature Reserve aims to address these various threats. The presence of armed groups in the Itombwe mountains that survive by pillaging natural resources both for their own benefit and for trading purposes constitutes a threat that has been weighing on the area for over 20 years. The artisanal exploitation of the forest, mainly for charcoal bound for Bukavu, has also caused significant degradation around and even in the Reserve, with South Kivu being one of the most densely populated provinces in the Democratic Republic of Congo. People have no access to alternative energy sources in this region. According to the GIZ Biodiversity and Forest Programme, 17% – that is to say 16,490 tons a year – of the fuel wood consumed in Bukavu is sourced from the territory of Mwenga, where the 3-D mapping pilot exercise was conducted. In the future, the development of roads in and around the Reserve, if not controlled, could also constitute a factor facilitating and encouraging the access to forest resources by external actors.

Lastly, the technicians who have supported the unfolding of the mapping exercise have superimposed on the model the mining concessions in the region. It is apparent that the mining company Banro was granted exploration licences in the Reserve. While not yet exploiting its mining rights, this nevertheless represents an important threat, should the company (which is already exploiting the lands around the Reserve) decide to begin extracting. The communities,

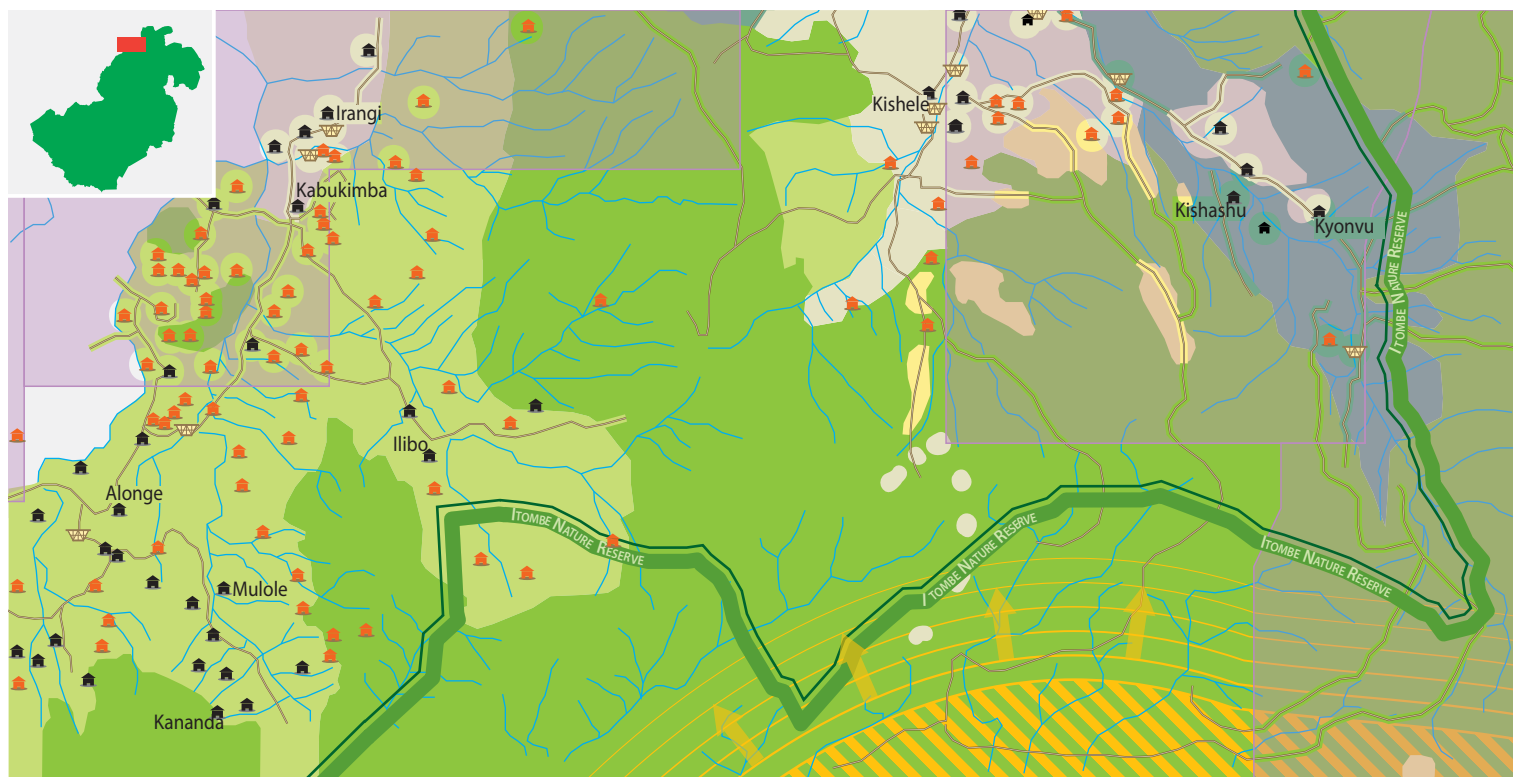
indignant to see their land allocated to an extraction company while they are working on a conservation process, have requested the immediate cancellation of these licences.

The work undertaken to date has also highlighted the significant displacement of populations within the Reserve. The *Bambuti* have indeed, as shown by the location of the old villages compared to that of the new ones, been displaced by these armed groups from their land in the high grounds of the mountain area all the way to the valleys. During the mapping exercise, many testimonies on the violent interventions of the militia were collected; these militia are mobile and likely to move towards villages for predatory raids. This has resulted in changes to the traditional activities undertaken by the communities. Pushed out of the forest, indigenous peoples have become more actively involved in small-scale agriculture and have begun to change their hunting practices. Trackers must now travel for several days through the forest, risking dramatic encounters with these armed groups in order to bring back game to their families. These changes are not beneficial for the communities or for biodiversity. In fear of a bad encounter, some hunters might be encouraged to kill in breach of the traditional rules. In addition, the lack of resources pushes certain communities to embark on charcoal trading along the roads. The participants thus hope that the establishment of the Reserve will enable them to safeguard their traditional practices, and for a number of them, to return to live in the forest.

Even though most of them now live outside of the primary forest, their attachment to this forest remains fundamental.

Deforestation is indeed a new concept for the *Bambutis*. Because these people do not traditionally exploit the forest and do not practise agriculture out of the forest cover, they were not used to seeing the forest become as degraded as can be seen in Itombwe, and are still shocked by it. This is why, while developing the map's legend, they proposed black to represent

the secondary forest: some wished to use black to evoke “the strangeness of seeing the ground instead of the forest”, while others suggested that “the ground does not have a colour, it is sometimes brown, red, beige or grey, and when one can see the ground of the [degraded] forest, it loses its colour. We cannot define this forest which is no longer a forest.”



## Threats to biodiversity and to the communities

- 🏠 Inhabited village
- 🏠 Village abandonné
- 🛤 Road (unpaved) and track
- 🛤 Bridge made of creepers

- 🏠 Industrial mining concession (BANRO)
  - 🏠 Presence\* and possible incursion of armed groups
- \*situation as of 2015 2015

- 🌿 Primary forest
- 🌿 Secondary forest
- 🌿 Bambu forest
- 🌿 Savannah
- 🌿 Straw and bush

Source : produced from a 3D model realized by the communities of Kitamba, Irangand Kigogo during a 3D cartography exercise in Mwenga, Mai 2016



## 4. ECONOMIC RESOURCES AND DEVELOPMENT NEEDS FOR THE COMMUNITIES

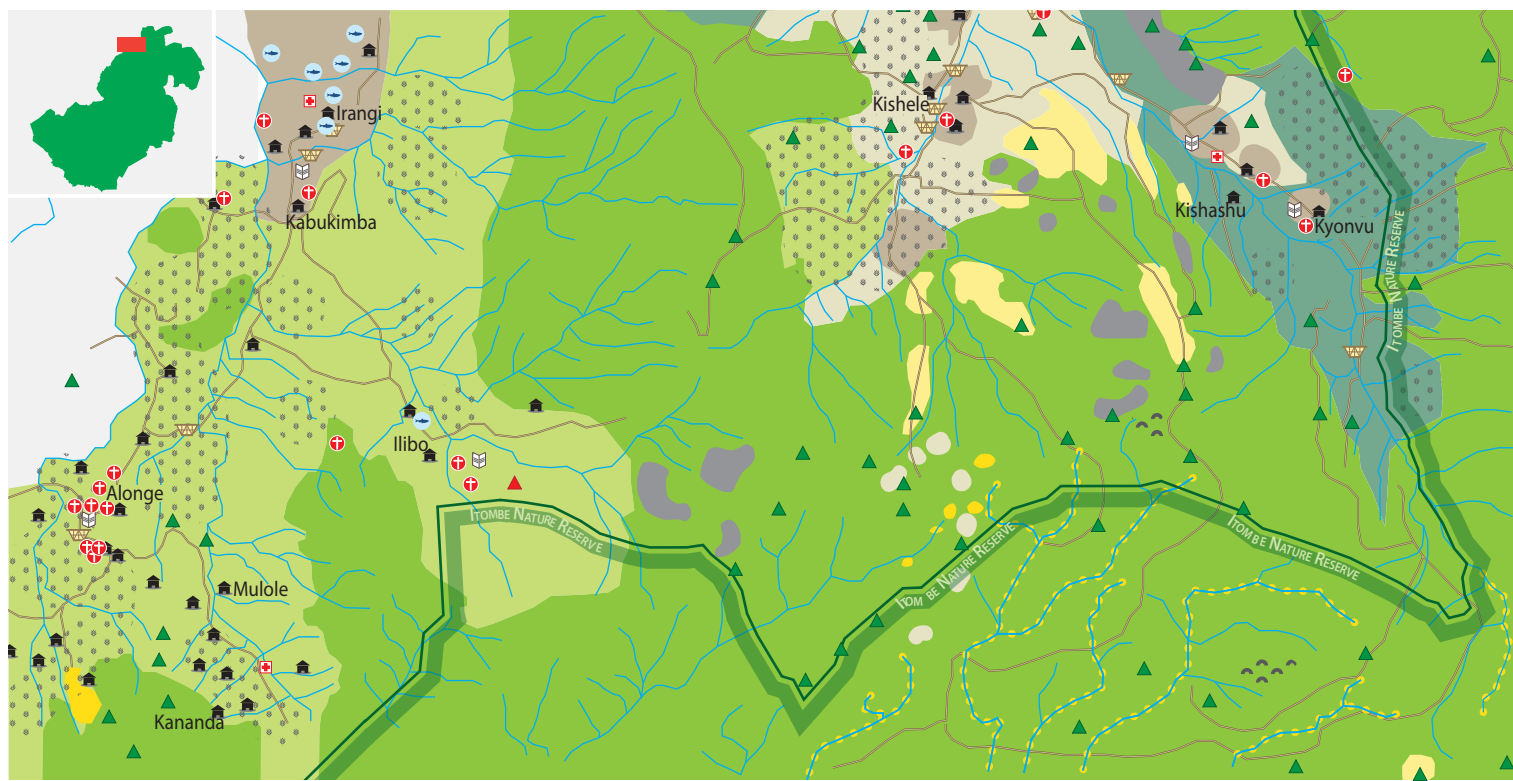
Now that they have been moved away from the forest and are living closer to roads and local economic centres such as Mwenga, the communities have begun engaging in economic activities related to the forest. Thus, we note the presence of mining sites in the Reserve. As Itombwe is rich in ores such as cassiterite and gold, certain inhabitants have started collecting these ores over and above their traditional activities, sometimes from the rivers, to sell them to local buyers. These activities have become a source of income for the various villages and their authorisation within the Reserve is cause for concern for the communities who wish to have them integrated into the plan for the Reserve. Provided that these activities are properly controlled and regulated, they could find their place in the future multi-purpose zone, the definition of which will thus have to be based on the presence of the existing artisanal mining squares.

The conduct of other activities within the framework of development projects could also offer economic benefits, as recommended by the grassroots committees. The production of honey for example, or the sale of products from fishing ponds, which have become alternative activities, but not substitutes, to hunting, could become income-generating activities contributing to local economic development, which communities are eagerly asking for.

The latter have indeed unanimously conveyed their desire to be given some

responsibility in the management of the Reserve, in the establishment of development projects in their villages and within the Reserve, and more specifically in the future multi-purpose zone.

The most recurrent requests related to access to health care and education, as well as the improvement of roads, which would enable communities to travel. The mapping model's study of the existing infrastructure, ease of access and proximity of centres of human habitation constitutes a source of information that is essential to the future formation of a development plan for the 60,000 inhabitants of the Itombwe Nature Reserve. The grassroots committees have already started a process of reflection within their communities on local development plans, but this requires planning on a regional scale in partnership with the institutions able to support such a plan and to invest the funds necessary for its implementation. Such a planning effort will inevitably entail challenges related to growing demographic pressure and the need to preserve forest resources, but it also represents a unique opportunity to combine the recognition of the traditional rights of local communities and indigenous peoples, good governance, protection of the forest and economic and social development.



## Development and new economic activities

- |                 |                             |                    |                  |
|-----------------|-----------------------------|--------------------|------------------|
| 🏠 Village       | 🐟 Fish pond                 | 🌿 Primary forest   | 🌾 Straw and bush |
| 🎓 School        | 🏠 Artesanal mining          | 🌿 Secondary forest | 🪨 Rocky area     |
| ✝️ Church       | 🛣️ Road (unpaved) and track | 🌿 Bambu forest     | 🏠 Village buffer |
| 🏥 Health center | 🌉 Bridge made of creepers   | 🌿 Savannah         | 🕒 Cave           |
| 🌾 Agriculture   |                             |                    |                  |

Source : produced from a 3D model realized by the communities of Kitamba, Irangland Kigogo during a 3D cartography exercise in Mwenga, Mai 2016



## CONCLUSION AND RECOMMENDATIONS

### 1. MAKING USE OF 3-D PARTICIPATORY MAPPING IN THE NEXT STAGES

The 3-D mapping pilot exercise studied here made possible the gleaning of critical information for the next stages – those of defining internal zones and their management modalities – in a short amount of time. The participatory definition of the Reserve's external boundaries was without a doubt a success, marked by the new decree of June 2016, which redefined the

boundaries of the area in keeping with the product of the mapping exercise. But this next stage will require careful attention in terms of the participatory methods adopted and the way that communities are involved in a process of FPIC.

The issue of co-administration of the Itombwe Nature Reserve, as per the needs of the



communities and as envisaged in 2008 during the Mount Kahuzi meeting during which the Joint Framework was founded, is intrinsic to consultation and participatory methods. The identification of traditional rights, but also of the importance of certain places in terms of culture, economic development and food safety, must serve as the point of departure of all discussions informing the definition of the integral, buffer and multi-purpose zones. Community rights can by no means be reduced to the multi-purpose zone, which does not constitute the only place where practices that are fundamental to the survival and the existence of the *Bambuti* take place. Henceforth, the uses and the management of the buffer and integral zones need to be

defined jointly with the communities, by taking into account the territorial dynamic at play in these areas.

In this context, 3-D mapping, a rather cost-effective and relatively user-friendly tool, presents methodological and practical advantages to support community participation. This tool constitutes a physical vehicle for consultation with communities, takes into account local management practises of the territory and enables documentation of the dynamics at play in this territory. It also allows makes it possible for the day-to-day realities of indigenous and local communities to be shared with the local authorities through a model accessible to all.



## 2. REPRODUCING THE MAPPING EXERCISE ON THE ENTIRE RESERVE

The 3-D mapping pilot exercise focused on a reduced zone of 200 km<sup>2</sup> adjacent to the Reserve and only one part of the space selected for the exercise is included in the current Itombwe Nature Reserve. The results, however, obtained by way of illustration and with the aim of presenting and showcasing the relevance of the 3-D approach to participatory mapping, allowed the fundamental territorial dynamics of communities in the zone to be expressed. These will have to be taken into account in the participatory zoning process and in the defining of the management modalities for the protected area. In order to gain a genuine understanding of territorial dynamics within the entire Itombwe Nature Reserve, engage in authentic consultation of the communities that live there and to enable a comprehensive long-term internal zoning and planning process, this 3-D mapping exercise will have to be replicated throughout the entire Itombwe Nature Reserve.

Note that the maps presented here are thematic and made from a visual extraction. Their purpose is to feature the territorial dynamics existing in and around the Itombwe Reserve, the traditional practices and daily activities shared by the communities during the 3-D exercise, and to gain a better grasp of the underlying stakes, which will have to be taken into account when defining the management

modality of the Reserve. These maps, however, cannot constitute a unique basis upon which to define the establishment of an internal zoning of the Reserve or of a internal zoning plan, as they do not provide the exact geographical co-ordinates of each of the points placed by the communities on the map. This would require an on-site GIS extraction to be transferred onto the model through an appropriate software.

At the end of this exercise, the communities who took part in it have unanimously recommended its replication on the entire territory that represents the Itombwe Nature Reserve, that is to say its 5,732 km<sup>2</sup>. The pilot exercise would need to be replicated about 30 times in order to cover the entire Reserve and adjacent areas. Although this might seem a high figure, it is nothing compared to the innumerable number of field visits that consultations in each village would require, or to the work involved in capturing GPS co-ordinates on the ground by community cartographers, often in places difficult to access.



### 3. DEFINING MANAGEMENT MODELS IN A PARTICIPATORY MANNER

On the basis of the participatory consultations that will certainly be conducted following the approval of its external boundaries, stakeholders will be able to establish the Itombwe Nature Reserve's management model. Even though formal discussions have not reached a conclusion, communities which took part in this pilot exercise have

stated their position in a clear manner, both during the creation of the model and when it was presented in Mwenga before the local authorities. These communities are fully involved in the process, and today they position themselves as the future managers of the Reserve. They are ready to ensure the management of the Reserve's three zones in

partnership with the ICCN and the support of the Joint Framework. They are also aware of the threats weighing on the resources of the Itombwe Nature Reserve and wish to defend their land, together with the State, from monopolisation attempts or the illegal exploitation of their natural resources, and to identify sustainable development pathways for local inhabitants. With the support of civil society and Rainforest Foundation Norway, they have therefore called for being granted greater responsibilities and for their empowerment in the next phases of the establishment of the Reserve through the formal recognition of their traditional rights on this land. While Itombwe has already, through the participatory definition of its external boundaries, pioneered a new approach to the establishment of a nature

reserve in the Democratic Republic of Congo, this experience must now be confirmed through the effective establishment of a participatory co-administration modality. The involvement of indigenous peoples in each step of decision-making, the adoption of participatory methods and the political will to ground the implementation of this Reserve on their rights will contribute to making the Itombwe Nature Reserve an innovative model of forest conservation based on the rights of the local communities and indigenous peoples. The Itombwe would thus become the first protected area defined and managed in a participatory manner, which will be a source of inspiration in the Democratic Republic of Congo and throughout the region.







