



## HOW SIMPLE RAISED RACKS HAVE CURBED FISH LOSSES AND CHANGED THE LANDSCAPE ALONG LAKE TANGANYIKA IN BURUNDI



by

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## Introduction

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Fisheries play an important role in the economic and social life in Burundi. Yet, about 10 to 15% of the harvest is lost during the processing phase. Fish drying, which is the most common processing technique in the country, was generally done on bare ground. This has led to partial or total alteration of the products, and has considerably reduced both income and livelihoods all along the value chain. Women, making up an important majority of the actors, were the most affected: they worked hard for a meager income.

In response to these issues, the Food and Agriculture Organization of the United Nations (FAO) and the Burundi Fisheries Directorate started in 2003 a project of 2 years for a total value of US dollars 282,000 to improve fish processing method and reduce losses. The project



targeted at first time the staff of the post-harvest unit of the Directorate of Water, Fisheries and Aquaculture in Burundi, to then be able to drive change among all categories of fish operators present in the project site: fishermen, processors and fishmongers, not only retailers but also wholesalers. In 2003, Mvugo, a fishing village located in the South on the shore of Lake Tanganyika, was chosen as the pilot site of the project where a demonstration platform for improved technologies has been constructed. For less than a

year during the implementation of the project, practical sessions for fish operators have been held on this site which was provided with various fish preservation and processing equipments. Specifically, the use of raised racks for fish drying was highly promoted; and women had a particular advantage during those training sessions.



Photo credits: FAO/Smartfish



Photo credits: FAO/J. Bitagoye

*Before: Sun-drying on bare ground/on the sand prevailed, with high post-harvest fish losses, poor safety, lower quality products*

*After: fish drying on raised racks, with reduced post-harvest losses, better safety, better quality products, improved consumer confidence and increased returns*

## Methodological approach

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The principle of raised-rack drying consists of putting the fish in contact with hot and dry air. In this way, water is removed from the surface of the fish and water moves from the deeper layers to the surface. To ensure an effective drying process, racks should be located in an exposed place, with a relatively low humidity. Sites providing good air circulation are recommended. During the whole operation, the fish should remain dry, and recovered with a tarpaulin, or put under shelter at night or during rainy days. The period of complete drying depends on the method used and the fish species. With the air circulation, the rack sloping system requires an average drying time of 8 hours in an ambient temperature of 42 ° C (10 hours for big fish and 6 hours for smaller ones).

The images below show the prototype of metallic raised racks promoted by FAO in Burundi. These are drying racks raised 1,10 m above the ground, with metallic or wooden supports. A 12 m long x 2 m large raised rack can receive up to 22 removable trays, with an average capacity of 12 kg of fish per tray.

*Dimensions:* length 12 m; width 2 m; height 110 cm

*Materials to be used:*

<b>Tube 40 x 40</b>	10 pieces
<b>Wood rod</b>	1 pack
<b>Cutting disc</b>	2 pieces
<b>Rust</b>	2 liters
<b>Grinding disk</b>	1 piece
<b>Cement</b>	3 bags of 50 kg each
<b>Sand</b>	2 m <sup>3</sup>
<b>Gravel</b>	1 m <sup>3</sup>

For the trays, the frames are ideally hardwood boards, resistant to heat, fungi, and insects attacks. The base of the frame is made by assembling pieces of wood nailed together. The mesh is placed underneath the frame with small nails. Then the 1,5 cm height batten is mounted from the lower bottom of the frame to maintain firmly the mesh in place. The planks are wider at the level of the frame (10 cm)



*Dimensions:* length 114 cm; width 90 cm; length of the handle 12 cm; height of the batten 110 cm

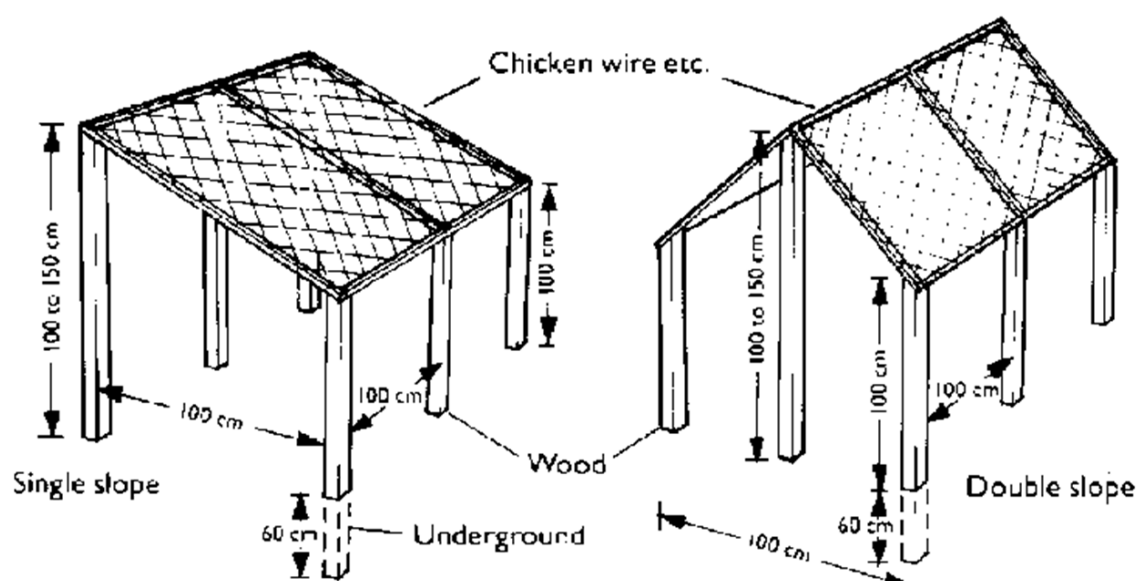
*Materials to be used (on the basis of 50 trays)*

<b>Beam for the body</b>	<b>60 pieces</b>
(width: 12 cm; thickness: 5 cm; length: 3,5 m)	
<b>Beams for the batten</b>	<b>10 pieces</b>
<b>7 cm nails</b>	<b>10 kg</b>
<b>4 cm nails</b>	<b>5 kg</b>
<b>Netting</b>	<b>55 meters</b>
<b>Antitermite liquid</b>	<b>10 liters</b>

### **Building raised racks made with wooden materials**

The images below show two sketches of constructed drying racks, based on a 1 m height timber. A taller pole of 1,5 m is used in the center or on one side of the rack, depending if a single or a double slope is needed.

To make the rack, 160 cm of timber are cut, and buried in the ground to a depth of about 60 cm. The distance between two lines is 1 m, which corresponds to the width of the drying rack. Lighter pieces of wood or bamboo are fixed between the top of the poles, before fixing other materials such as chicken wires, mosquito nets, or old fishing nets to support the fish.





## Validation and impact

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Almost 10 years after the closure of the project in 2005, the dissemination of the use of raised racks along the fishing sites in Burundi demonstrates its success. Nowadays, drying fish on raised racks has become a common practice in all fishing ports in Burundi, and no more the exception to the rule as it prevailed before the project. The beneficiary fishing communities have fully adopted the improved fish processing techniques. Fish processors in Burundi have realized drying fish on racks is more hygienic and an efficient way to attract consumers. On the border of Lake Tanganyika, in lieu of building houses for rent, people build racks because they are more profitable, and many people make a living from them.

The use of raised racks has contributed to an innovation in the livelihood of men and women fish operators in Mvugo first, then in Burundi in general. Their productivity and income have considerably increased. In particular, the role of women in ensuring household food and nutrition security has been enhanced. Using raised racks for fish drying has ensured a high level of productivity of the fishing sector. The level of post-harvest losses, due to inadequate drying practice, has more than halved. End-products supplied to consumers are of a better quality, and fish prices more than doubled from Burundian francs 4.000 to 9.000 (or from US dollars 2.5 to 6). Racks-dried fish are highly appreciated by consumers, and fish operators and traders reap higher incomes.

On the other hand, this positive evolution has also led to an influx of working population towards fish processing and trade activities in Burundi. The number of jobs directly related to the sector has increased from 500 in 2004 to approximately 2.000 in 2013.

## Success factors

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Besides the conducive measures to a smooth implementation and effective output delivery laying in any development project - and that were ensured by the technical cooperation project<sup>1</sup> -, two key factors drove its success and observed impact: first, the **institutional set**

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<sup>1</sup> The Technical Cooperation Programme (TCP) is a part of FAO's regular programme, financed from the assessed contributions of its Members. The Programme aims to provide FAO's technical expertise to its Member countries through targeted, short term, catalytic projects which address technical problems in the field of agriculture, fisheries, forestry, and rural livelihood. Such problems prevent Member countries, either individually or collectively, from implementing their development programmes.

**up at the end of the project (1), and second, the creation of an enabling environment by the Burundi government (2).**

1) Indeed, a sustainable management mechanism was recommended at the end of the project and was actually followed up, materialized by two functions of the Mvugo centre. This latter has been set as a national reference didactic tool that harboured training and capacity development activities within the framework of new fisheries assistance initiatives, for example the training of refugees or ex-combatants organized by humanitarian agencies. That didactic function was made possible thanks to the signature of a Memorandum of Understanding between the Burundian Ministry for Agriculture and Livestock and the professional organization entrusted with the management of the centre. Actually, the Mvugo center also fulfils a productive function where fish operators meet for fish processing activities from fish preservation, drying, smoking and packaging. The centre is handled by a user group who has received technical trainings, and is provided with a clear management and maintenance plan, an operating account and a resource mobilization capacity.

2) But the Burundi government has also supported the community dynamic to facilitate any process that would prevent possible conflicts and inequities in the use and procurement of production inputs. The government has instituted a land tenure policy which allows fishers of all categories to access a plot to establish their racks. The above elements have contributed to the success and sustainability of the project.

### **Constraints encountered and challenges**

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The **security situation** prevailing in the country in 2003 delayed some activities and it was even necessary to reallocate the budget leading to focusing on one pilot site instead of two as recommended during the project formulation phase. An additional constraint was the **purchase of materials** for building the raised racks. During the project implementation, FAO promoted the use of metallic racks. Since racks built with metallic materials are expensive, only relatively wealthier operators can afford to acquire them. That is how some fish processors started introducing racks with cheaper materials, such as wooden, or nets of different mesh sizes. These ones are however of lower quality and with much shorter life span, but at least, they offer the opportunity for the most vulnerable to benefit from the advantages of the innovation. The innovation was very successfully adopted and disseminated.





Photo credits FAO/J. Bitagoye

*On the left: Fish dried on wooden racks*



Photo credits: FAO/J. Bitagoye

*On the right: Fish dried on metallic racks*

Nonetheless, a realistic assessment of the situation underlines the need to address the **impact of climatic vagaries** on the natural drying which is very difficult if not impossible to undertake during rainy season or on cloudy days. Other techniques such ones that promote the use of renewable energies could be promoted in present and future initiatives. Before the implementation of the project in 2004, 80% of the fish processors were women. Nowadays, as this activity has become more and more profitable, men have increasingly invested in the sector. It is estimated that now, men form 30 to 40% of the large racks owners in the lakeshore communities. As competition increases, **women have now become quite marginalized** as they have limited access to production resources. It would be wise to provide women and other marginalized fish operators some micro-finance schemes so that they could be empowered equitably.

## Lessons learned

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This good practice experience in Burundi demonstrates the importance of raising awareness among the beneficiaries on a basis of a cost-benefit analysis of the proposed technology. Fish operators in Mvugo have been shown how they could benefit from the new practice, before they decided to adopt it. Afterwards, they even played a pivotal role in disseminating the improved processing techniques to other fishing communities in Burundi. Most importantly, one should also highlight the sound institutional set up and openness of the government to accompany the innovation through enabling measures it has created. The Burundi government has specifically shown a political commitment in addressing food security issues by

promoting responsible governance of land tenure, and by facilitating land access to fish operators for them to install their racks.

## Replicability

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The use of raised racks has been first experienced in Mvugo, a fishing site in the province of Makamba. But then, it has spread all across the fishing ports in Burundi, notably in Rumonge, Muguruka, Kagongo, Karonda, Magara, Gitaza, Kajaga, and Gifuruzi. The expansion of this technique shows the good practice can be successfully replicated. Some conditions should be met to ensuring this replicability and up-scaling. Fishing communities in the target areas should understand the drawbacks of their practices, how it impacts their income, then be convinced of the incentives brought by the new techniques. Indeed, fish operators in Mvugo have adopted the use of raised racks while seeing the economic and social benefits derived from it. The Burundi good practice experience – in other terms the promotion of the use of raised racks for fish drying – could be replicated through a participatory approach from all relevant stakeholders in other fishing sites in Burundi, in riparian countries and even at sub-regional level, wherever fish drying on bare ground is still a common practice. It is easy to replicate, to purchase and to operate. It requires from the local authority to create an enabling environment not only for the implementation of the project itself but also for its sustainability, and this entails amongst other things a supportive land tenure policy in favour of fish operators to build racks. Development agencies should also be willing to invest in the adoption of this good practice, the sensitization of the fishing communities being the pillar of a successful project.

## Conclusion

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The positive evolution in the fish processing activities in Burundi shows how innovative the FAO project “*Support to Post-harvest Fisheries Technology*” was. The success of the project could have been sustained, and the project was an inspiration for similar interventions in Burundi today. Most importantly, the project personnel and its beneficiaries agree unanimously on the fact that the project has achieved its objectives and contributed much to the development of the fisheries sector not only in Burundi but also in its neighbouring

countries. Along and after the project, the working and living conditions of fish processors have got improved, especially those of women who are the mostly involved in fish processing activities.

Pascasie Bucumi, a 60 years Burundian fish processor, testifies that the method of improved fish drying that uses raised racks, has really been a big help for her, considering the challenges and constraints she has to experience during the drying operations. *‘I have practiced the fish drying activity for almost 15 years now, long before the introduction of raised racks. We used to dry fish on the ground. It was a really hard*



From the video on success story FIPM/FAO

*work. I recorded a lot of post-harvest losses, and sometimes, the fish was so damaged that I could get nothing from it. For example, when it rained, the fish could not be protected. Or it was often trampled underfoot by animals or people passing by. The dried fish product was of poor quality and could not be preserved too long. It spoiled quickly’.* Now, Pascasie uses the raised racks for her fish drying operations, and benefits from the advantages of better quality products that could be sold at higher price. *‘With the improved fish drying technique, I could manage to win Burundian francs 30,000 per day’*, Pascasie explains. *‘Today, I am a widow and live alone with my 7 children. But I have no problem in paying their school tuition, and I could buy clothes for them and for me. Previously, this was just impossible’.*

## **For more information**

Presentation “Support to post-harvest fisheries technology”

[www.slideshare.net/FAOoftheUN/save-food-fisheries](http://www.slideshare.net/FAOoftheUN/save-food-fisheries)

Videos on this success story produced by FIPM, FAO in collaboration with the Directorate of Fisheries in Burundi:

ENGLISH - Long version: [www.youtube.com/watch?v=Wv4\\_wemgGhU](http://www.youtube.com/watch?v=Wv4_wemgGhU)

ENGLISH - Short version: [www.youtube.com/watch?v=Uf5SJcFlco](http://www.youtube.com/watch?v=Uf5SJcFlco)

FRENCH - Long version: [www.youtube.com/watch?v=OIWwCNKp\\_fm](http://www.youtube.com/watch?v=OIWwCNKp_fm)

FRENCH - Short version: [www.youtube.com/watch?v=HRDfvypdWAs](http://www.youtube.com/watch?v=HRDfvypdWAs)

Brochure “Simple fish-drying racks improve livelihoods and nutrition in Burundi”

[www.fao.org/in-action/simple-fish-drying-racks-improve-livelihoods-and-nutrition-in-burundi/en/](http://www.fao.org/in-action/simple-fish-drying-racks-improve-livelihoods-and-nutrition-in-burundi/en/)

Link to FAO Fisheries and Aquaculture Department:

<http://www.fao.org/fishery/topic/736/en>

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