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Examples of Participatory Rural Appraisal (PRA) in wetland development in Guinea Bissau

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• Introduction

Small parts of the swampy areas along estuaries in West Africa that are covered with mangrove forests have been reclaimed and developed for rice cultivation by farmers for centuries. They build small dikes and dams to stop the tidal seawater from inundating the lands and to capture the fresh water runoff from the higher areas. Wooden tide gates are installed in the dikes to drain the excess fresh water in the rainy season. In Guinea Bissau such traditional polders are called ‘ .

The ‘*Serviços de Hidráulica Agrícola e Solos’ (SHAS)* in the northwest of Guinea Bissau is a service that aims to improve the physical infrastructure and develop human resources in *bolanha*s. SHAS deals with many aspects of the problems in traditional and ‘modern’ polders, and in some of its activities Participatory Rural Appraisal methodologies have been applied. In the first example participatory mapping with the use of aerial photographs was used in the communication with farmers about future construction plans in a polder and the management of the present drainage system. In the second case farmers from two different ethnic groups have a long standing dispute for control over newly reclaimed lands. A participatory mapping exercise with the use of aerial photographs was initiated in order to facilitate the registration of the users’ rights. The third example shows ranking exercises of weeds that help identify the potential for rice cultivation according to farmers' perceptions. The presence of weeds can help in assessing the feasibility of land use options.

• Mapping of hydrological features

The *bolanha* of Quide-Com is 70 ha, including canals and dikes. In 1987 farmers paid a private company to dam an estuary with machines, and thereby enlarged their *bolanha*. Most of the mangrove is cleared and it is divided in plots by bunds and small dikes. The dam is in good condition, but the farmers had to install a large tide gate to be able to drain excess fresh water during the rainy season. Heavy downstream erosion of the outlet canal and the dike in which the gate was installed led to breakage of the dike, and salt water entered the *bolanha* in the cropping season of 1989. In 1990 SHAS and the farmers constructed a concrete tide gate with reasonable downstream protection and reinforced the surrounding dikes. The objective of the mapping exercise was to facilitate a discussion about future management and construction plans based on a farmer-made map of the *bolanha*.

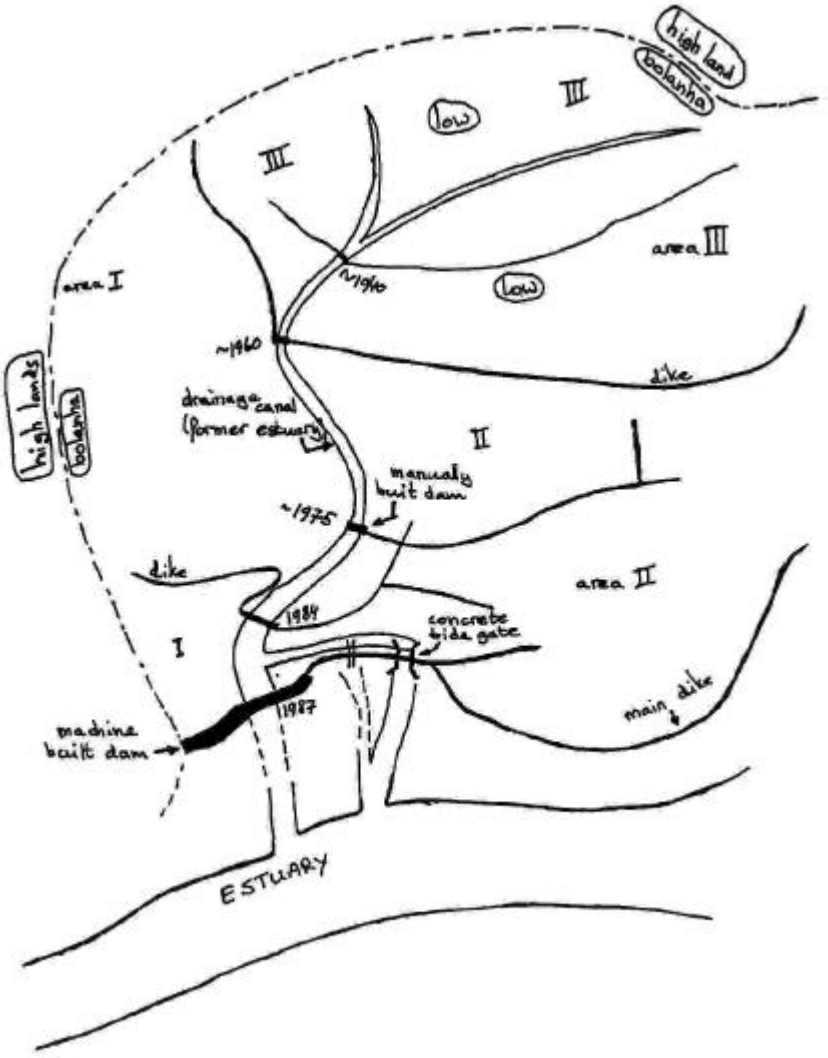
Preparation and mapping

A map of 1:50,000 from the 1950s and an aerial photograph of 1989 (scale 1:30,000) were available and taken to the village close to the *bolanha*, where a meeting was organised. A magnifying glass was not taken.

The farmers located, correctly and with great enthusiasm, paths, houses and different parts of the *bolanha* on the photographs. They drew the main canal in the *bolanha* (the former estuary). Although the bends in the canal they had drawn could be matched easily with the photo, some dikes and small dams they drew were not traceable (see Figure 1). Meanwhile they had put the photo aside.

Source: RRA Notes (1993), Issue 17, pp.49–56, IIED London

Figure 1. Hydrological situation in the bolanha of Quide-Com



Of the five little dams drawn inside the *bolanha* only the two most recent ones still exist. The sequence shows the gradual enlargement of the *bolanha* over the last 50 years. With the dams and dikes indicating this history the farmers divided the *bolanha* in three hydrological units: two along each bank of the former estuary close to the gate, and one lower lying area far away from the gate.

They proposed to raise the small dikes around areas I and II, so that fresh water would be retained while opening the tide gate to drain area III. They explained that farmers in area III should start cultivation earlier in the season than the rest, since a developed crop can sustain deeper inundation. They showed that in area III the landownership is limited to members of only one of the two villages, which have people working lands in the *bolanha*. In area I, an area with few drainage problems, mostly farmers from the smaller village have their plots. Many farmers who were supposed to cooperate with the new timing have land in both area III and in area I and II, so drainage interests are well divided. The management options proposed by the farmers are exactly the same as promoted by engineers: make a few more or less independent units with different water levels and with different crop timing within a polder, and use the central drain for quick drainage.

Source: RRA Notes (1993), Issue 17, pp.49–56, IIED London

• Mapping of land distribution

The *bolanha* of Có-Timate was reclaimed after the construction with machines of a dam in an estuary. The area is 280 ha, including 60 ha of water surface. After the closing of the estuary, the lands were not divided by either the government or the population. There were continuing conflicts between groups of Balantas and Mancanhas[1] who participated in the construction and the maintenance of primary dikes, and/or paid some money for the construction.

In 1990 in the presence of government representatives, the population took the decision that *"... those who cleared lands will have the first right on that part ..."*. After this SHAS was to help mark the plots and register the land use rights. The work could not be finished that year due to difficulty of access in the rainy season.

To confirm the demarcation of the first plots, and to try to speed up the process, farmers were asked to participate in a mapping exercise. The idea was that if they would mark those who cleared land on a self-made map that was comprehensible for SHAS staff, fieldwork could be checked and future fieldwork would be much easier and quicker.

Preparation and mapping

A map with scale 1:5,000 was available. It was made before the mangrove was cleared and shows some major estuaries and contour lines. Also available were aerial photographs (from before clearing the mangrove and after) on a scale of 1:30,000. This material, and a magnifying glass, were taken to the *bolanha* where farmers from all communities had gathered.

Farmers first studied the photographs, with and without the magnifying glass. They had no trouble in identifying roads, paths and housing areas and were very excited to recognize their environment on the photographs. The canals visible from the mapping site were easily located on the photographs.

One man who often fishes in the *bolanha* canals drew its major former estuaries in the sand, but many others participated in the exercise. The shapes and bends matched reasonably well with the map, but the farmers started to put in all the little creeks they found on the photographs and announced after some time that it would take them too much time to make a map with all the details.

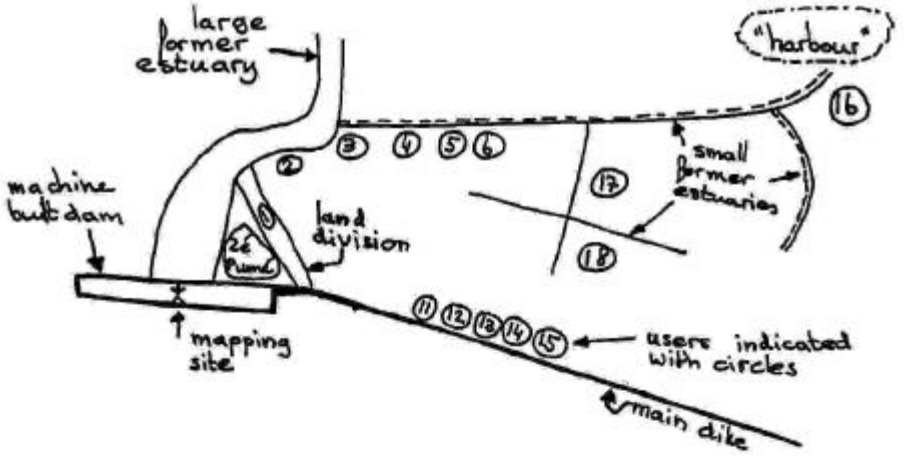
Afterwards they started again and drew only the major canals, indicating some farmers' plots with little circles (see Figure 2a). After some discussion they started a third time, now showing some narrow rectangular plots more or less perpendicular to the main canals, the way plots are normally oriented in *bolanha*s (see Figure 2b). A fourth fresh attempt resulted in details of the land division on another part of the map, actually indicating plot boundaries in relation to minor canals. This part of the map was drawn on a bigger scale than the earlier part (see Figure 2c).

SHAS staff listed the names of the indicated plot-users and verified the map in the sand with the results of the demarcation of plots in the field. The map showed the bends in canals in a recognizable way and confirmed the registration of the surveyors. However, the farmers refused to continue drawing the rest of the *bolanha* and to show the boundaries of the cleared, but not yet marked, plots. This proved to be too sensitive an issue (see Conclusions).

[1] Balantas and Mancanhas are two ethnic groups in Guinea Bissau.

Source: RRA Notes (1993), Issue 17, pp.49–56, IIED London

Figure 2a. Land use map in bolanha of Co-Timate – second version



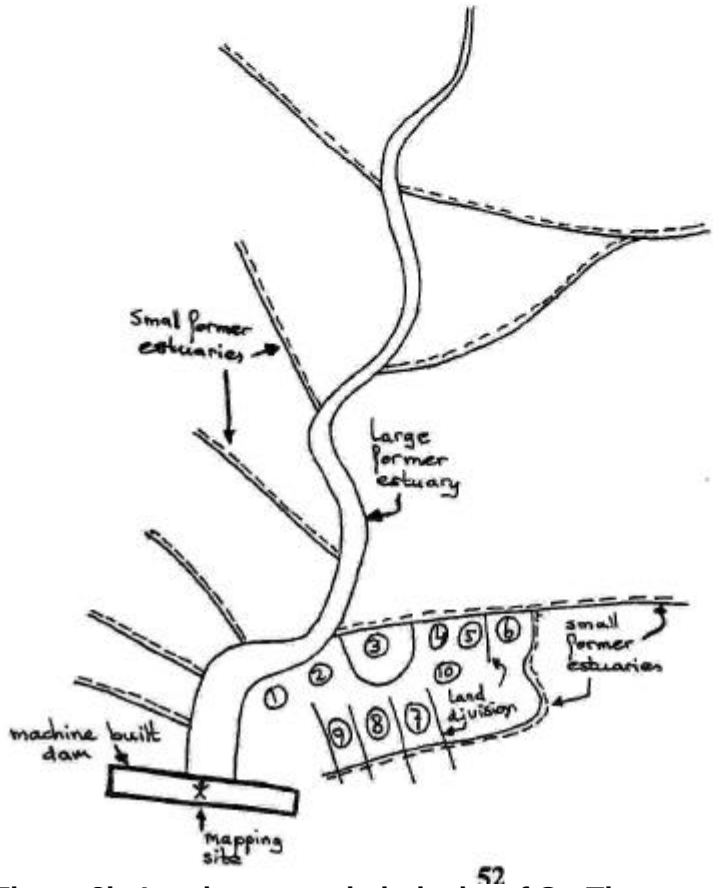


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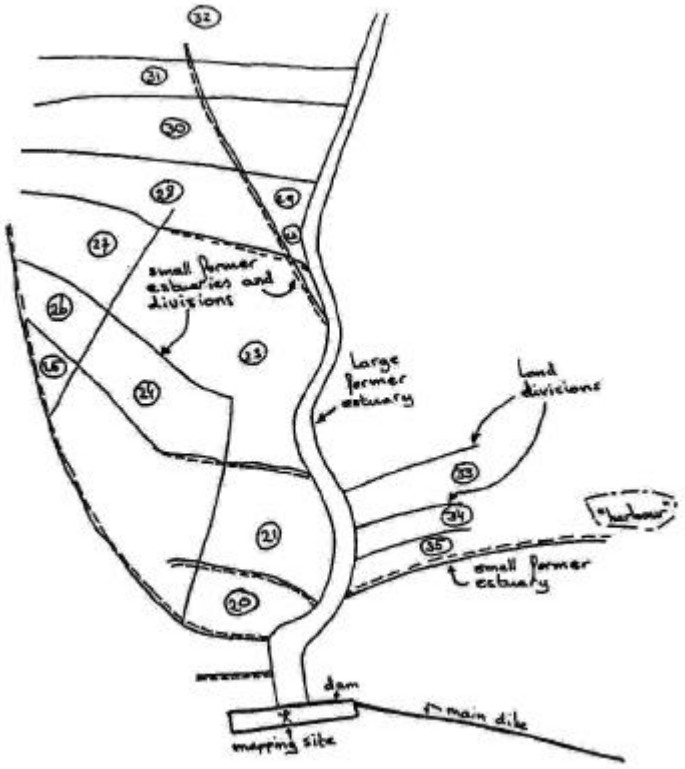
Figure 2b. Land use map in bolanha of Co-Timate – third version

Source: RRA Notes (1993), Issue 17, pp.49–56, IIED London

Figure 3. Land use map in Bolanha of Co-Timate – fourth version



• Ranking of weeds to indicate land suitability

In undertaking this exercise we assumed that farmers working in *bolanhas* have some sort of collective knowledge about valuing pieces of land in terms of the potential for rice cultivation. One of the visible aspects that play a role in their judgements is the presence of different types of weeds.

Preparation

A Manjaco[2] farmer was requested to indicate weeds that, according to his knowledge, could be found in *bolanha*s, using photographs found in Terry, 1986. He did so and also described some of their properties. With this first idea of what to look for, he was invited to participate in the ranking exercises with some Balanta farmers. Nine weeds were selected in one *bolanha* by SHAS staff.

The ranking exercises

After explaining the purpose of the visit and lining up the weeds to start the pair-wise comparison for the first interview, farmers fetched a tenth weed. This was considered the worst one they knew. The question used in the pair-wise comparison and ranking can be translated as *"if you had to chose to start cultivating rice either in a plot infested with this or with that weed, which plot would you prefer to use?"*. This question hides the fact that a few plants present of one species may be as bad as a field completely covered by the other. The question may also make people respond referring to the physical potential as well as, for instance, to the work needed to plough the fields.

While comparing the weeds in this way with all other weeds and keeping the score in a table, farmers were also asked to give some characteristics of each, to answer the question *"why are they good or bad?"*. Some properties given by farmers, local names and likely scientific names are summarised in Table 1. The results of 3 repetitions of this ranking exercise are quite consistent, as is

[2] Manjacos are an ethnic group of Guinea Bissau.

Source: RRA Notes (1993), Issue 17, pp.49–56, IIED London

shown in Table 2. The results of ranking the resistance of weeds and their seeds against salt water, and the workload they provoke to plough the land (manually) is shown in Table 3.

Table 1. Names and properties of weeds

Weed number/ Manjaco name/ Balanta name	Probable Latin name/family	Some Key Properties
1. bsi-el/Mbubua	Euphorbia heterphylla L. (Euphorbiaceae)	no danger[3]; easy to pull out; in fresh parts of *bolanha*
2. umpinnapin/Boseh	unknown, looks like weed number 5	no danger; hardly obstructs ploughing; seeds are not fertile
3. petakka/Nratat	Cynodon dactylon (L.) Pers. Gramineae	good if worked into the soil and decomposing, but reproduction by roots, no seeds
4. piam/Thuleh	Cyperus difformis L. (Cyperaceae)	sharp leaves; some liquid comes out that intoxicates the *bolanha*; without weeding no rice; with little salt water the plant dies, but seeds survive
5. umbintin/Boseh	unknown, looks like weed number 2	no danger; hardly obstructs ploughing
6. Mbi-ef/Nfendeh	(Gramineae)	in higher fresh parts of the *bolanha*; many seeds of this weed suppress the growth of no.10; good if worked into the soil and decomposing; laborious to plough the land; many seeds survive even if weeds in *bolanha* are burned in the dry season
7. piam-pkas/Bdiheh	Cyperus esculentus L. (Cyperaceae)	threatening for rice; found in parts inundated with fresh water; with a little salt water the plant dies, but the seeds survive
8. pnok-pi-im/Bdiheh	Cyperus	one rarely finds fields completely covered with this weed
9. ptak-blek/Bdiheh	Cyperus difformis L. (Cyperaceae)	dangerous; with little salt water the plant dies, but seeds survive
10. pnok/Mboron	Cyperus	the worst, some red, sometimes blue liquid comes out, looks like oil on the water, that intoxicates the *bolanha*; no seeds, reproduction by roots; only disappears after years with salt water inundation and mangrove has come back to the *bolanha*

[3] Danger refers to potential to (severely) limit rice cultivation.

Source: RRA Notes (1993), Issue 17, pp.49–56, IIED London

Table 2. Results of ranking the best weeds in relation to the potential for rice cultivation

Potential for rice	Interview 1	Interview 2	Interview 3	Overall ranking	Manjaco name
favourable	6	5	5	5	umbintin
favourable	3	6	2	6	Mbi-ef
favourable	5	3	3	3	petakka
no danger	2	8	6	2	umpinnapin
no danger	1	9	1	1	bsi-el
some danger	9	4	7	8	pnok-pi-im
some danger	7	2	8	9	ptak-blek
some danger	8	1	9	7	piam-pkas
dangerous	4	7	4	4	piam
dangerous	10	10	10	10	pnok

Note:
1. The numbers refer to the weeds in Table 1.
2. The overall ranking is the average of the "place numbers" of the weeds in the 3 interviews?
3. The weeds in the last two groups, Nos. 4, 7, 8, 9 and 10 all belong to the family *Cyperaceae*.

Table 3. Ranking of some specific properties of the weeds

	plant resistance against salt water	seed resistance against salt water	workload while ploughing the field (manually)
low resistance/ low workload	1		5
	7	4	2
	8	1	9
	9	9	8
	4	8	1
	6	7	7
	5	6	10
	2		6
very resistant/ high workload	10		4
	3		3

Notes:
1. The numbers refer to the weeds in Table 1.
2. Some weeds do not produce seeds.

• Conclusions

The first example shows that the farmers are well able to interpret the small scale aerial photographs, but they didn't seriously use them while drawing the map. It remains a question whether studying the photographs was of influence so that the drawing matched reality better. But the map was a very good communication tool and showed the history of the polder in relation to the present situation. This was not asked of the farmers, but is highly relevant for the understanding of the hydrological problems and plans.

The objective of the second exercise, to advance with the actual fieldwork of land registration on the basis of a map drawn by members of the population, was not reached. The division of land is too sensitive to be able to start the registration without actually marking it in the field. But the people have shown that they can draw maps quite accurately and detailed, confirming the work already done by surveyors. The quality and usefulness of the map improved considerably after some initial attempts. The small scale aerial photographs may have influenced the farmers in the sense that they started to draw many details. But the photos may also have influenced their drawing of the bends in and size of canals, and therefore may have

Source: RRA Notes (1993), Issue 17, pp.49–56, IIED London

facilitated the matching of their map with others.

The detail on large scale photos is greater, so the initial confusion caused by the 1:30,000 photos may be expected to be worse when using a scale of 1:5,000 or even 1:2,000. But the ease with which farmers locate features on the photos suggests that instead of drawing maps in sand, farmers could make thematic maps on paper copies on larger scales. This is confirmed by experiences in Nepal (Carson, 1987), Ethiopia (Sandford, 1989) and Kenya (Mearns, 1989). Enlarging an existing aerial photograph of 1:30,000 to 1:5,000 and printing it on tracing paper (to be used for reproduction) is reported to cost, in Guinea Bissau, about US$175 per photo (KLM aerocarto). This will, however, not show up invisible features, such as the former dams.

The following can be concluded from the third exercise:

- Photographs of plants in a book with scientific descriptions are very helpful in discussing weed problems with farmers.
- Simple ranking exercises with only a few people quickly leads to a wealth of practical information about the potential of *bolanhas*.
- Important characteristics of weeds, on which farmers judge the potential of a field for rice cultivation are the workload to plough the land, the resistance of the weeds and seeds against salt water and burning, and 'liquids coming out of the plants', i.e. toxic substances that are associated with the presence of the plants.
- If *Cyperaceae* occurs in the fields, then this indicates serious limitations for rice cultivation.

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