

Electronic Appendix: Methods for the ranking of ESS by stakeholders and details of calculations

Research design

The TFO project team identified and defined 11 ecosystem services which it investigated from an interdisciplinary perspective. To this list, a 12th ESS – *Fish or Growth of fish* – was added after conducting pre-test interviews, as fish is a major ecosystem good used by the population of the ORB. Table 1 presents the 12 ecosystem services, giving an explanation of each, the translation in all the languages used in the interviews. ESS cards, featuring one to four illustrative pictures

(Fig. 1a - Fig. 11) and the name of the ESS in the appropriate language, were designed. The cards were presented to stakeholders during face-to-face semi-structured to structured interviews. They were first explained in English and then in the appropriate language. Secondly, any questions of clarification from the stakeholder were answered. Thirdly, the respondent was allocated as much time as needed to rank the cards to his/her own satisfaction. Fourthly, the respondent explained the logic behind his/her ranking.

In total, 90 interviews with stakeholders from the three countries of the Okavango River Basin, active at four scales of decision-making on land use (local, regional, national and transboundary) were conducted (Fig. 2). 75 interviews could be used for the ESS ranking analysis (Tab. 2). Stakeholders ranked the 12 cards by order of importance or priority from their own perspective (1: highest importance and 12 lowest one). *Ex aequo* were allowed.



Figure 1a: Illustrative pictures: ESS Climate regulation.



Figure 1b: Illustrative pictures: ESS Environmental settings.



Figure 1c: Illustrative pictures: ESS Hazard regulation.



Figure 1d: Illustrative pictures: ESS Staple crops



Figure 1e: Illustrative pictures: ESS Thatching grass



Figure 1f: Illustrative pictures: ESS Tree growth



Figure 1g: Illustrative pictures: ESS: Vegetables



Figure 1h: Illustrative pictures: ESS: Livestock



Figure 1i: Illustrative pictures: ESS: Wild species diversity



Figure 1j: Illustrative pictures: ESS: Water availability



Figure 1k: Illustrative pictures: ESS: Wildlife



Figure 1l: Illustrative pictures: ESS: Fish

Table 1: Ecosystem services (ESS), explanation and translation in all languages in which the interviews were conducted.

ESS English	Explanation	ESS Rukwangali	ESS Setswana	ESS Portuguese	ESS Ombundu
Thatching grass	the fact that the environment provides a system in which thatching grass can grow / the fact that there is thatching grass in the system / thatching grass - May include REEDS	Wayi woku tungisa non-zugo	Go tlhoga ga bojang le lethaka le go bapalwa ga tsone	Capim para telhado (Sappé)	Owangu Ocho Tu Kapi Konjo
Environmental Settings	the sense of place; the bond that people may feel with their surroundings. Ex: beauty of landscape for tourists or for leisure; the feeling of belonging to home village	ngapi omu azi kuninkisa nsitwe oligwanekere noyisitwa yimwe	iketlo le Tshosologo ya mowa, e kgathisa matlho e fa le boleng le thokgamo	Ligação das pessoas ao ambiente envolvente (gustar, pertencer, aproveitar)	Ovi tumalo viwa vio kupapala. Kuenda Evi via tu tamba.
Livestock	the fact that the environment provides a system in which livestock can grow / the fact that there is livestock in the system / livestock	Yimuna yivhure kaparuka	Tshiamelo ya go ka rua	Produção de gado e animais domesticos	Okukwata Oloqombe olohombó
Water availability	the fact that water flows in the river and is available for use (water levels/water quantity)	Kugwana mema mon-sitwe	go nna teng ga metsi	"Disponibilidade de água	Okukwata ovava Akva

ESS English	Explanation	ESS Rukwangali	ESS Setswana	ESS Portuguese	ESS Ombundu
Hazard regulation	the fact that the environment when it is healthy, can help to reduce the consequences and amplitude of natural disasters/hazards. Ex: of Hazards: Bush fire, droughts, floods. Ex of hazard mitigation for flood hazard: if the environment is healthy, with good flood plains and reeds and trees to absorb the water in the soil, then the flood may not be as disastrous. If you would have degraded river banks with no vegetation, the flood water will spread further and will make more damage.	Kutakamesa maudona gahoroka monsitwe	seabe sa tikologo mo go ka imelaneng le dibetsa tsa tholego	Regulação de problemas naturais (Cheias, seca, incendio, ...) - Redução das consequências das problemas naturais	Okukwata Ovitangui vivito vio Mbela, Okuwata ovisengue vikasi okuyokiwa
Trees	the fact that the environment provides a system in which trees can grow / the fact that there is trees in the system / trees	yitji Kuvhura yikwie	tshiamelo ya gola mo ditlhare	Árvores	Oviti
Climate regulation	the fact that Climate is a process which can be regulated and deregulated. When there are strong changes in CO ₂ or Forest cover, the climate may change. Consequences for southern Africa is assumed to be less reliable rainy season with more extreme events, possibly less predictability of the rainfall pattern.	Elitjindjo lyoyinema	seemo sa loapi se se laolesegang se se maleba go ya ka tikologo eo	Regulação do clima	Okukuliha olotembo vihua

ESS English	Explanation	ESS Rukwangali	ESS Setswana	ESS Portuguese	ESS Ombundu
Species Diversity	all of God's creation; the fact that the environment supports many different species: directly useful for people such as honey bees or indirectly useful in the system, such as earth worms or millipedes.	Yisitwe Yokuli siga-siga	tshiamelo ya bolenteng le kgolo tse tsotlhe tse di tshelang ka go farologana ga tsone	Diversidade de especies	Ovina Suku Apanga
Staple crops	the fact that the environment provides a system in which staple crops can grow / the fact that there is staple crops in the system / staple crops	Kuvhura kakuna nombuto	tshiamelo ya go ka lema dijalo ka go farologana	Culturas (essenciais à sobrevivencia das pessoas)	Okulima olombuto via velapo vali ocho omano vache
Vegetables	the fact that the environment provides a system in which vegetables can grow / the fact that there is vegetables in the system / vegetables	Kuvhura kukuna mahidi	Tshiamelo ya go ka lema merogo	Legumes	Akovi
Wildlife	the fact that the environment provides a system in which wildlife can grow / the fact that there is wildlife in the system / wildlife. Includes nice wildlife and scary or destroying wildlife	Yikorama, noyikasama	tshiamelo ya go nna teng le ntsifalo ya diphologolo tsa naga	Vida selvagem	Ovinhama viu sengue

ESS English	Explanation	ESS Rukwangali	ESS Setswana	ESS Portuguese	ESS Ombundu
Fish (included in wildlife in the rest of the TFO framework)	the fact that the environment provides a system in which fish can grow / the fact that there is fish in the system / fish	nomfi omu adiparuka	tshiamelo ya go nna teng le ntsifalo ya ditlhapi le tse tsotlhe tsa metsi	Peixe	Ombici

Table 2: Number of interviews conducted per country and scale (N is the total number of interviews conducted; N*is number of valid interviews used for the ESS ranking analysis).

Scale	Angola		Namibia		Botswana		Total	
	N	N*	N	N*	N	N*	N	N*
Basin	2	1	4	3	4	3	10	7
National	8	5	6	5	5	5	19	15
District	12	8	12	12	9	6	33	26
Local	11	10	8	8	9	9	28	27
Total	33	24	30	28	27	23	90	75

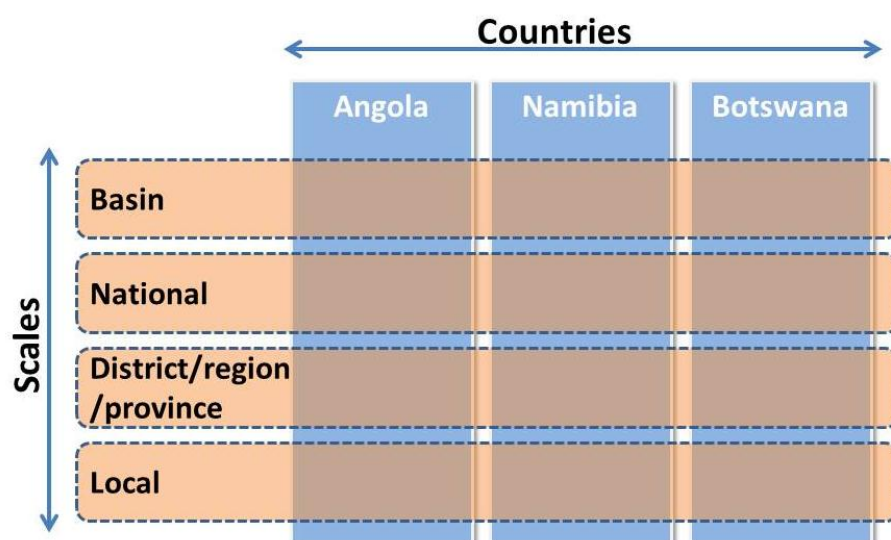


Figure 2: Research design – comparison of 4 scales for decision-making on land use, for the 3 countries of the Okavango River Basin.

Translation and meaning of the ESS

A discussion about the meaning and content of each ecosystem service took place with each interpreter before translation. ESS were translated in the main indigenous languages (Ombundu in Angola, Rukwangali in Namibia and Setswana in Botswana, but it may be noted that some of the local land users might have another mother tongue (Tab. 1). Challenges occurred in explaining the (scientific) meaning of given ESS to some stakeholders who may not have been used to thinking of the environment in terms of different discrete elements rather than as a whole. In some cases, two ESS were understood by stakeholders in a

slightly different manner to that initially intended in Table 1:

- The ESS *Environmental settings* also included, for some stakeholders, the awareness of people for their environment and for the fragility of the environment
- The ESS *Climate regulation* was understood in two different ways. To anyone who does not know the concept, I explained climate regulation in terms of keeping the seasons stable, temperatures stable and extreme events not increasing in frequency. This explains the high ranking of Climate regulation among the local population as well. Stakeholders who knew about climate regulation, sequestration and the scale at which the

process occurs ranked this ESS based on this supplementary knowledge.

Calculations for analysis

Distribution descriptive statistics (median) were calculated for each of the 12 ESS for each scale in each country and for the entire region. The median ranking, minimum, maximum, and percentiles provide a detailed picture of how a group of stakeholders is evaluating the importance of a given ESS. The lower the rankings for an ESS, the more it is perceived as important, and vice versa.