An expert-based approach to assess the potential for local people engagement in nature conservation: *the case study of the Niassa National Reserve in Mozambique*

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Sequence of the presentation

1	**Introduction**
2	**Research Question**
3	**Methodology**
4	**Results**
5	**Conclusion**

People lives inside Protected Areas (PA´s) faces many challenges:

- Lack of Infrastructure (NCP, 2015);

- Insufficient livelihood;

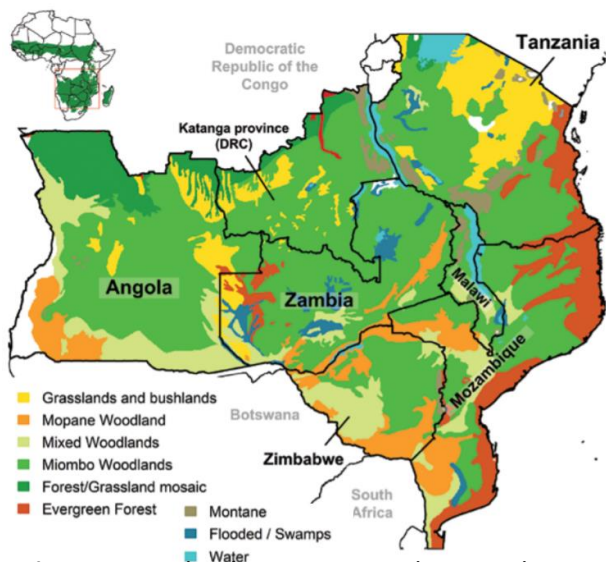- Vulnerability to climate and other risks (Giva, 2016);

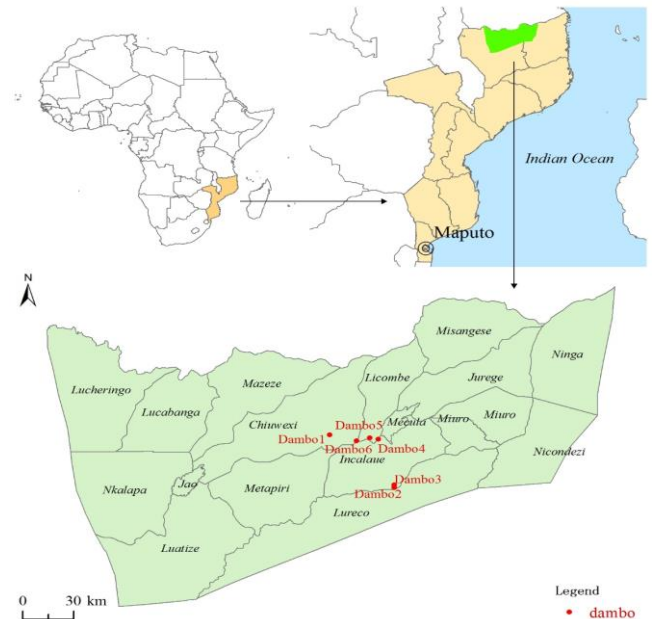**Figure** - main land cover type in the miombo ecoregions Ryan et al., 2016

Figure - Geographic location of the dambos used for data collection in the Niassa National Reserve (NNR)

People lives inside Protected Areas (PA´s) faces many challenges:

▪Coexistence with wildlife (Bluwstein and Lund, 2016; Rodriguez Solorzano and Fleischman, 2018; Shafer, 2015);

▪Human-wildlife conflict (HWC) seriously threaten conservation, livelihoods and life itself of people living inside PA´s (Hua et al., 2016 & Madden and McQuinn).

Photos from Niassa Carnivore project (report 2016)

1 Introduction

Besides HWC, people inside PA´s are also frequently involved with practices that threatening conservation, such as:

- Poaching and illegal trade of wildlife products (Jorge et al., 2013);

- Unsustainable hunting for bushmeat (Niassa Carnivores Project (NCP, 2015);

- Illegal logging and mining.

These illegal activities have been putting most of African large carnivores and herbivores at risk (Thouless et al., 2016; UNEP et al., 2013; Zafra-Calvo et al., 2018).

Logging   Elephant Poaching   Bushmeat Snaring   Population Growth   Bold and Ruby Minig

Photos from: Niassa Carnivore Project, Annual Report 2015

Local people engage with these conservation-threatening practices for several possible reasons:

- (1) they don't see any tangible benefit arising from conservation (Aheto et al., 2016 & NCP, 2015);

- (2) they lack alternative livelihoods options and depend on those practices for food and income (Bluwstein and Lund, 2016 & Rogan et al., 2018);

- (3) they are not aware about the importance of conservation;

- or (4) for several of these reasons, they perceive conservation as an illegitimate interference in their daily pursuits (Beale et al., 2013; Gandiwa et al., 2013; Holmes, 2014).

Each one of these motives behind conservation-threatening practices needs to be addressed through specific policies that promote the required changes in behavior and actions.

1 Introduction

Based on experts' knowledge which is often a key tool to design and deliver effective conservation actions (Beale et al., 2013; Červený et al., 2019; Waylen & Martin-Ortega, 2018), we have developed a method to:

- (i) identify the role of local people among other actors, in major threats to conservation;

- (ii) the underlying drivers for local people's involvement in conservation-threatening practices;

- and (iii) appropriate policies to address these drivers in a particular PA.

Research Question

Some specific questions addressed with this research are:

- Is there a consensus among conservation experts?

- Or are there alternative views concerning some issues?

- Can these alternative views be explained by experts' background (e.g. their area of training, organization, education and experience in conservation)?

- Are the views on the diagnostic, policy evaluation and new proposed incentives/compensation schemes coherent with each other, so that they can be considered logical steps towards policy proposals?

Methodology
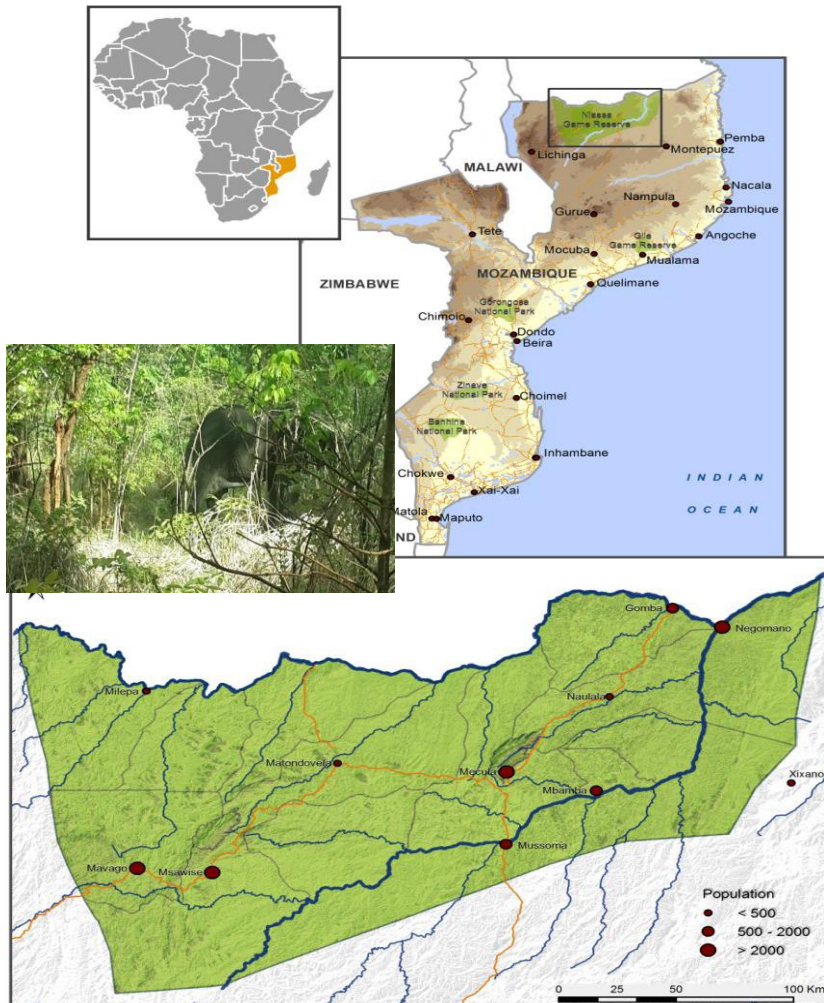
Niassa National Reserve

- Is the largest protected area in Mozambique and the third in Africa (Prin et al., 2014)

- Covers 42,300 km^2 (Ribeiro et al., 2008);

- Accounts to 45% of the conservation areas in Mozambique (Ganzin et al., 2010);

- Is one of few intact savannahs remain in the world (Ribeiro et al., 2013; WWF, 2012);

- Home of 1200 lions, one of remaining seven places with > 1000 lions (Riggio et al., 2013)

More than 40,000 people living across 42 villages inside the reserve, representing an increase of 37.5% in the last ten years (NCP, 2015).

Map from: Niassa National Reserve Management Plan for 2007 to 2012 (2008)

3 Methodology
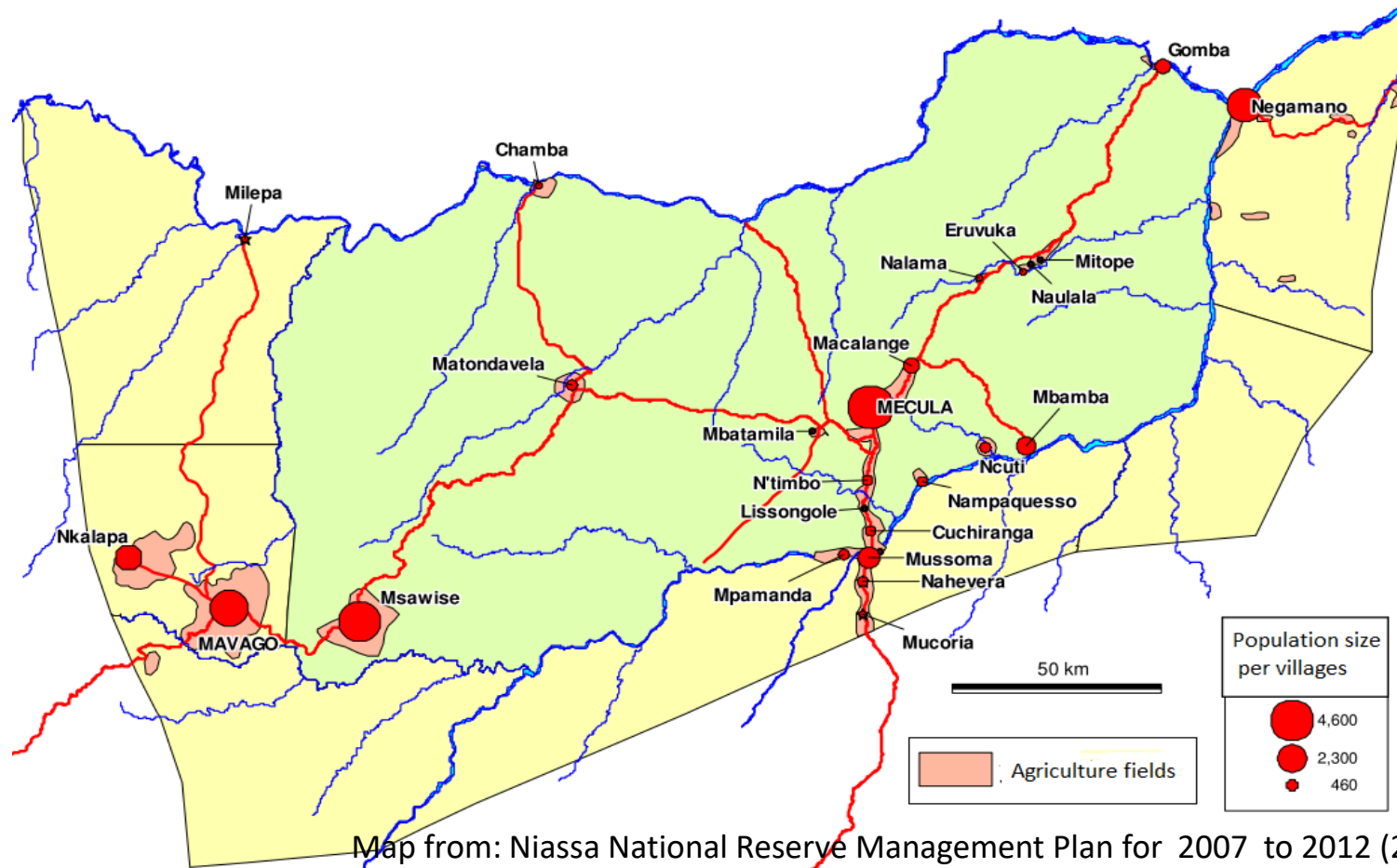
Data collection and analysis

Online and self-administration survey was given to experts, involved in the design and implementation of conservation measures in Mozambique.

To be selected, experts should: (1) have worked or still work in Mozambique in conservation-related activities;

(2) have substantial knowledge about policies and laws that govern PA´s in the country;

and (3) know the current management state of the NNR including threats, compensation schemes and the role of all actors involved in conservation.

3	**Methodology**

Organization	Number of respondents (%)
Conservation NGOs	9 (16)
Private sector (concessionaries of Hunting Blocks)	4 (7)
Governmental institution	
National Ministry of Land, Environment and Development	5 (9)
Provincial and district environment and conservation related institution	19 (35)
Academic Institutions	
Universities and Technical Institutes	10 (18)
Research institutions	2 (4)
Others	6 (11)
Total	**55 (100)**

Table 1. Organizations from which the surveyed respondents were drawn
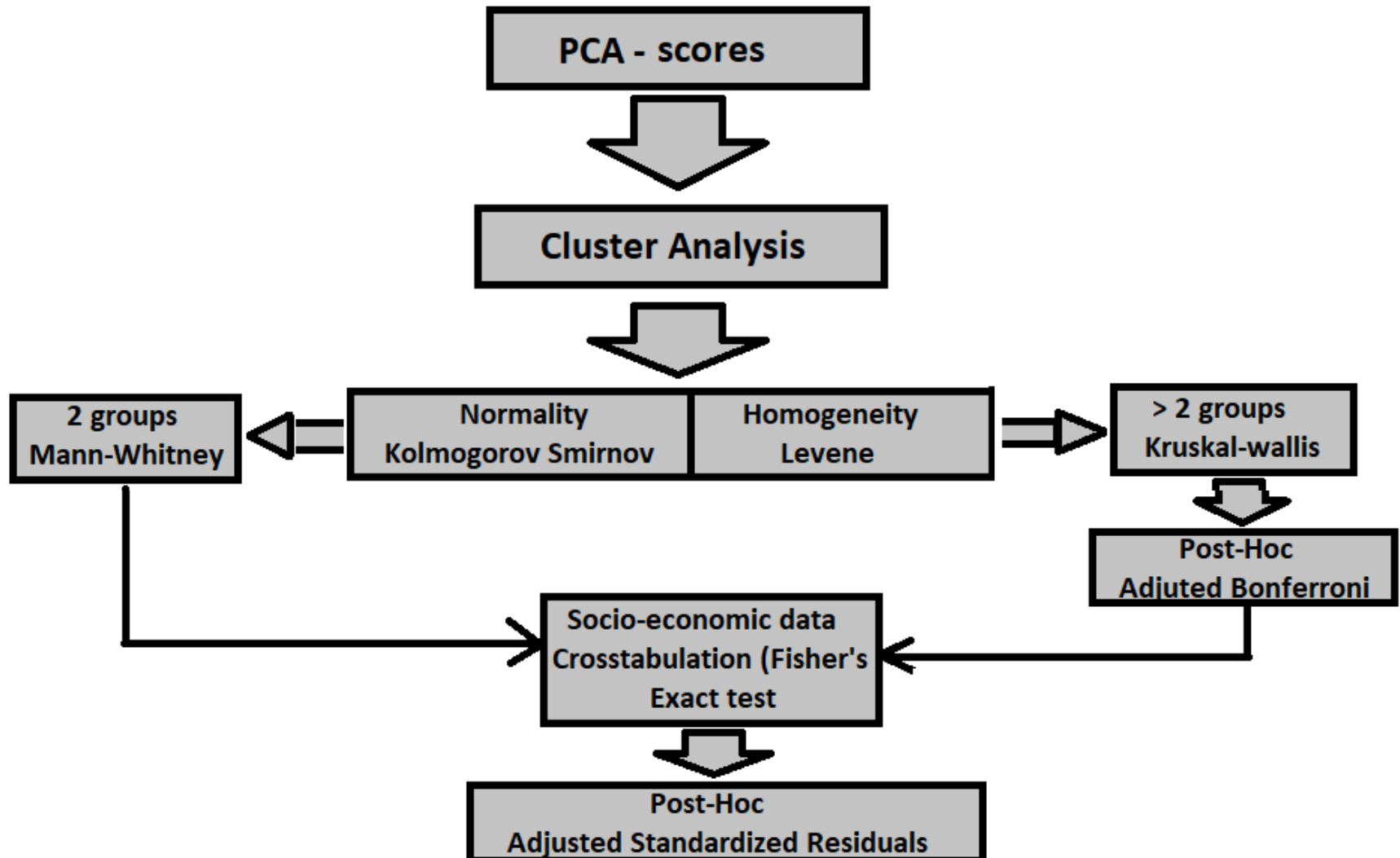
Nº	Major themes	Ratings scale	Source
Q.1	Identify the degree of threat each of the existing problems in the NNR represents for conservation	0=very little, 1=little, 2=moderate, 3=high and 4=very high	(Booth, Vernon R.; Dunham, 2014; Jorge et al., 2013; Martins, 2015; MICOA, 2014; NCP, 2016, 2015)
Q.1.1	Among different actors, indicate the main responsible for each of these threats.	0 = No, 1 = Yes	
Q.2	Several reasons for local people to be involved with practices that threaten conservation	2=strongly agree, 1=agree, 0=undecided, -1=disagree and -2=strongly disagree	(Aheto et al., 2016; Bluwstein and Lund, 2016; Giva, 2016; MICOA, 2014; Mombo et al., 2014; NCP, 2015)
Q.3	Put the current compensation measures in order of importance to the local population	6=most important to 1=least important	
Q.3.1	Limitations with the way that current compensation measures are being delivered	2=strongly agree, 1=agree, 0=undecided, -1=disagree and -2=strongly disagree	(Muarapaz, 2016; NCP, 2015; Tembo et al., 2015)
Q.4	What will be the effectiveness of each new measures below in order to promote the adoption of conservation-friendly practices	2=very positive, 1=positive, 0=no effect; -1=negative and -2=very negative	(NCP, 2015)
Q.4.1	Level of improvement with adoption of new measures	4=76-100%, 3=51-75%, 2=26-50%, 1=1-25% and 0=0%	Authors
Q.4.2	Level of improvement in people behaviours and motivation for conservation	4 =very high, 3 = high, 2= Moderate, 2= low and 0=Null	

Table 2. Ratings scale coded for the four major themes experts were requested to answer

3 **Methodology**

PCA - scores

Cluster Analysis

| 2 groups Mann-Whitney | Normality Kolmogorov Smirnov | Homogeneity Levene | > 2 groups Kruskal-wallis |

Post-Hoc Adjuted Bonferroni

Socio-economic data Crosstabulation (Fisher's Exact test

Post-Hoc Adjusted Standardized Residuals

N°	Variables	Frequency	Percentage (%)
1	Gender		
	Male	43	78.2
	Female	12	21.8
2	Education		
	Professional Education (basic or secondary)	15	27.3
	Upper Secondary School	6	10.9
	Higher Education	34	61.8
3	Major Field		
	Agriculture	32	58.2
	Biology	4	7.3
	Social Sciences	9	16.4
	Others	10	18.2
4	Years of experience in conservation		
	1 - 2	16	31.37
	3 - 5	19	37.25
	6 - 10	12	23.53
	> 10	4	7.84

Table 3. Socio-demographic information of respondents

Table 4. Degree of threat to conservation associated with each problem in the NNR – overall and cluster medians (values in the brackets, represent the number of experts per clusters and its respective percentage).

Nº	Problems	Cluster medians			Overall median	P-Value (α)
		N1 (24|44%)	N2 (19|34%)	N3 (12|22%)		
1	Cut and burn agriculture	3ab	3a	2.5b	3	0.018*
2	Commercial farming	2a	2a	1b	2	0.001**
3	Sport hunting	1ab	2a	1b	1	0.018*
4	Poaching	4	3	4	4	0.050^{NS}
5	Bushmeat	1b	3a	1.5ab	1	0.004**
6	Extraction of non-timber products	1b	1a	2a	1	0.001**
7	Wood fuel	2	3	2	2	0.262^{NS}
8	Illegal logging	3	2	3	3	0.195^{NS}
9	Fishing	2b	2b	3a	2	0.006**
10	Population growth	2.5	3	3	3	0.196^{NS}
11	Human and wildlife conflicts	2c	3b	4a	3	0.000***
12	Illegal gold and ruby mining	3	3	3	3	0.952^{NS}
13	Projects and Infrastructures	1b	2a	1.5ab	1	0.000***

Note: Respondents rated the degree of threat associated to each activity in a 5-point scale from 1 (null) to 5 (very high). The P-value corresponds to the Kruskal-Walls (KW) test, with the following levels of significance: NS = not significant, *= significant at 0.05, ** = significant at 0.01 and *** = significant at 0.001. Lowercase letters in the line represent post hoc statistical differences between clusters resulting from pairwise comparisons - values with the same letter are not statistically different
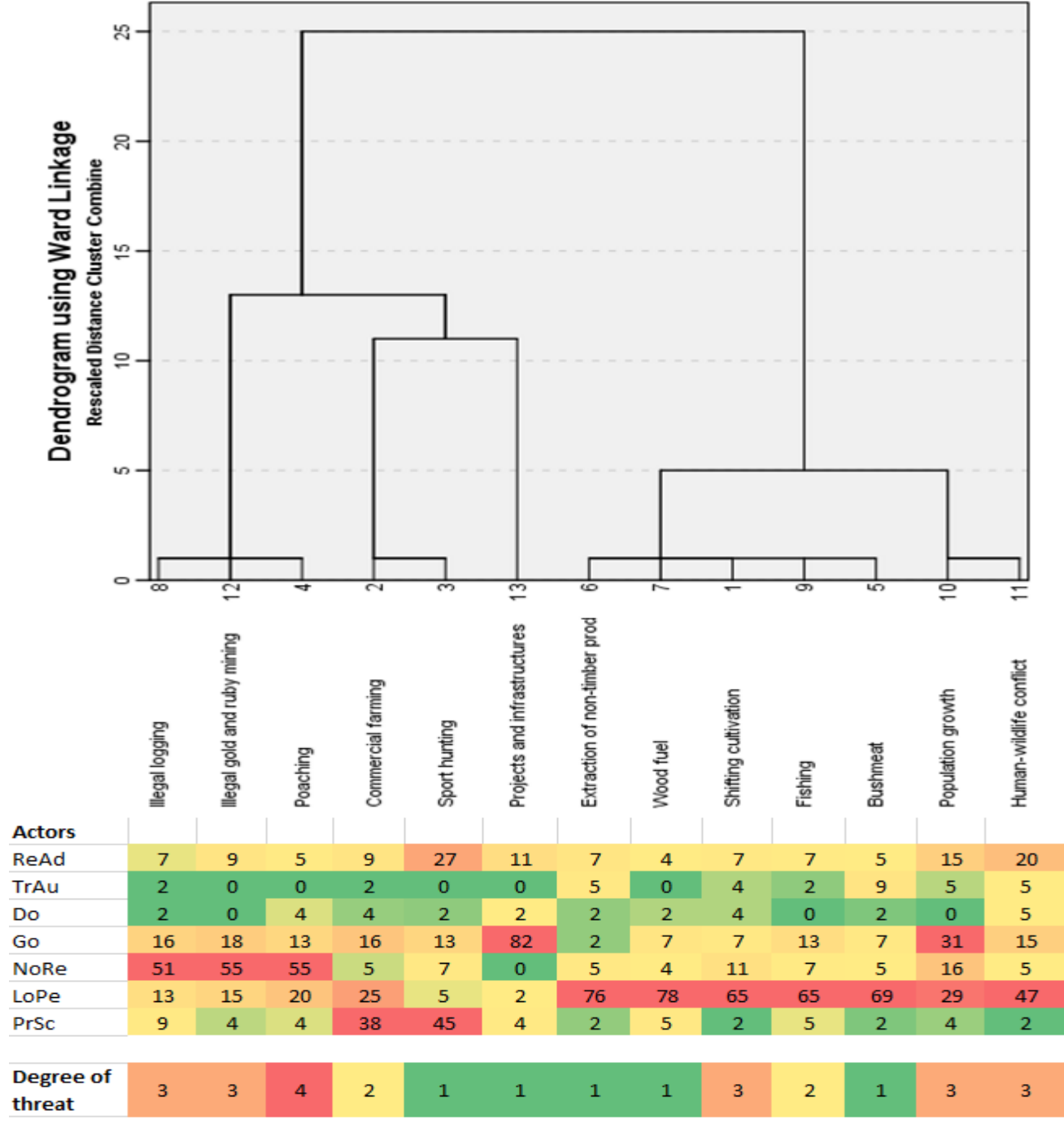
Actors	Illegal logging	Illegal gold and ruby mining	Poaching	Commercial farming	Sport hunting	Projects and infrastructures	Extraction of non-timber prod	Wood fuel	Shifting cultivation	Fishing	Bushmeat	Population growth	Human-wildlife conflict
ReAd	7	9	5	9	27	11	7	4	7	7	5	15	20
TrAu	2	0	0	2	0	0	5	0	4	2	9	5	5
Do	2	0	4	4	2	2	2	2	4	0	2	0	5
Go	16	18	13	16	13	82	2	7	7	13	7	31	15
NoRe	51	55	55	5	7	0	5	4	11	7	5	16	5
LoPe	13	15	20	25	5	2	76	78	65	65	69	29	47
PrSc	9	4	4	38	45	4	2	5	2	5	2	4	2
Degree of threat	3	3	4	2	1	1	1	1	3	2	1	3	3

Figure. Illustration of dendrogram with thirteen data points, that represent different threats to conservation. Attached to the dendrogram is the map of actor's: Do=Donors ReAd=Reserve Administration, NoRe=Non-residents, LoPe=Local People, PrSc=Private Sector (PrSc) and TrAu=Traditional Authorities, their share of responsibility for each threat in percentage (from red to green represents the high to less gradient of responsibility shared by each actor), and degree of threat (from red to green represents very high to little degree of threat each problem represents for conservation.

DRIVERS OF CHANGE

ECOSYSTEM SERVICES	Direct drivers						Indirect drivers			
	Poaching *# Mining	Shifting * cultivation	Honey and * plants collection	Fishiring #	Animals disturbance	Wood and fuel * exploitation	Econimic	Sociopolitical	Demographic changes	Science and Thechnology
Regulation and Maintenance										
Regulation of wastes	→	↑	→	↑	☐	→	?	?	↑	?
Flow regulation	↑	↑	?	↑	☐	→	↑	→	↑	?
Regulation of physical environment	?	↑	→	→	☐	→	?	→	↑	↑
Regulation of biotic environment	↑	→	→	→	↓	→	↑	↑	↑	?
Provisioning										
Nutrition	↑	↑	→	↑	→	↑	↑	↑	↑	?
Materials	↑	→	→	→	☐	→	↑	↑	↑	?
Energy	?	→	→	→	☐	→	→	→	↑	→
Cultural										
Symbolic	→	?	?	?	☐	?	?	→	↑	?
Intellectual and Experiential	→	→	?	→	☐	?	?	→	↑	?

ARROW'S DIRECTION
⇩ Decreasing impact   ☐ No impact
⇨ Continuing impact   ? Unknown impact
⇧ Increasing impact

ARROW'S COLORS INTENSITY OF IMPACT
High impact
Moderat impact
Low impact

Brennan and Kalsi, 2015; Maquia et al., 2013; Martins, 2015; Muarapaz, 2016; Ribeiro et al., 2013, 2008; Sociedade da Reserva do Niassa , 2008; Tembo et al., 2015; UNEP et al., 2013; Zefanias, 2013)

Table 5. Reasons for local people being involved with practices that threaten conservation in the NNR – Overall and clusters medians. (values in the brackets, represents number of experts per clusters and its respective percentage)

Nº	Problems	Cluster medians					Overall median	P-Value
		N1 (7|13%)	N2 (14|25%)	N3 (13|24%)	N4 (13|24%)	N5 (8|15%)		
1	Livelihood Insufficiency	1ab	1b	2a	1ab	2ab	1	0.018*
2	Conservation does not bring any benefit	0ab	-1b	-1b	-1ab	1a	-1	0.000***
3	People don't know the importance of conservation	-1acd	-1d	1abc	2a	2ab	1	0.000***
4	The local people are corrupted	0b	2ab	1ab	1ab	2a	1	0.044*
5	Feeling of injustice in benefits sharing	2a	1bc	1abc	-1c	1ab	1	0.000***
6	Conservation only creates problems	-1ab	-1b	-1ab	-1ab	-1a	-1	0.012*
7	Conservation only benefits foreigners	0ab	-1b	-2b	-1b	1a	-1	0.000***
8	Local people are not well involved on the decision making	1	1	1	1	2	1	0.405^{NS}
9	Opposition to the restrictions	1abcd	1ab	1abc	-1d	1a	1	0.010*
10	Low education	0c	1abc	2ab	1abc	2a	1	0.001**
11	Lack of infrastructure	2ab	-1c	1abc	-1c	2a	0	0.000***

Note: Each reason for local people being involved which practices threat conservation in the NNR was rated by respondents in a 5-point scale from strongly disagree (-2) to strongly agree (2). The P-value corresponds to the Kruskal-Walls (KW) test, with the following levels of significance: NS = not significant, *= significant at 0.05, ** = significant at 0.01 and *** = significant at 0.001. Lowercase letters in the line represent post hoc statistical differences between clusters resulting from pairwise comparisons - values with the same letter are not statistically different.

Table 6. Compensation measures that are currently placed in the NNR and its limitation - overall and cluster medians (values in the brackets represents the number of experts per clusters and its respective percentage).

Nº	Current compensation measures	Clusters medians			Overall median	P-value
		N1 (26|47%)	N2 (15|27%)	N3 (14|26%)		
1	Jobs for the local people (e.g. Forest ranger position)	6	6	5	6	0.110[NS]
2	Hunting quotes allocated to communities	4b	5a	5a	4	0.008**
3	20% delivered to the local people	4	4	4	4	0.068[NS]
4	Food allowances for local people	1b	1ab	3a	1	0.009**
5	50% of the revenue of the fines	3a	2b	3ab	2	0.038*
6	Promotion and respect of culture and beliefs of local communities (e.g. sacred places)	3a	3ab	2b	3	0.001***
Nº	**Limitations of the current compensations**					
1	Lack of transparency in the criteria of job allocation	1	1	1	1	0.584[NS]
2	The hunting quotas allocated are insufficient	1	1	1	1	0.988[NS]
3	The money allocated is insufficient	1	0	1	1	0.351[NS]
4	Lack of monitoring and accountability of revenues (20%)	2a	1ab	0b	1	0.000***
5	In many cases, the detectors of the offenders aren't awarded	1a	0b	1a	1	0.000***
6	Weak training and advice in how to use the compensation	2b	1a	0a	1	0.000***
7	Poor monitoring and evaluation of the results from the projects implemented in NNR	1a	0b	1ab	1	0.008**
8	The above compensations are not enough to motivate the community	1ab	-1b	1a	1	0.022*

Note: Compensation measures that are currently placed in the reserve were ranked by respondents as most 6=important and 1= least important. While limitations were rated in a 5-point scale from -2 (strongly disagree) to 2 (strongly agree). The P-value corresponds to the Kruskal-Walls (KW) test, with the following levels of significance: NS = not significant, *= significant at 0.05, ** = significant at 0.01 and *** = significant at 0.001. Lowercase letters in the line represent post hoc statistical differences between clusters resulting from pairwise comparisons; values with same letter are not statistically different.

New proposed compensation measures

Table 7. List of new compensations measures proposed to improve conservation in the NNR. overall and cluster medians (values in the brackets represents the number of experts per clusters and its respective percentage).

Nº	New compensations	N1 (14|25%)	N2 (19|35%)	N3 (11|20%)	N4 (11|20%)	Overall median	P-Value
1	Create areas for cultivation of high-yield commercial crops	0c	2ab	2ab	2a	1	0.000***
2	Help local people to adopt environmentally-friendly cultivation practices	1abc	2a	0c	2ab	1	0.012*
3	Provide local people with alternative sources of animal proteins	1b	1ab	2ab	2a	1	0.036*
4	Promoting certification of non-timber products	1a	1ab	-2c	1abc	1	0.014*
5	Help local people with practices to enhances the sustainable use of forest resources	1ab	2a	1b	1ab	2	0.016*
6	Involve local people in the management and decision-making	1ab	2a	-1b	1b	1	0.000***
7	Increase in the percentage of revenues charged to distribute to communities	0b	1a	2a	-1b	1	0.000***
8	Increased employment in conservation and recreation activities;	2	2	2	1	2	0.525NS
9	Attribution of collective conservation performance-based payments	0b	1a	1ab	0b	1	0.000***
10	Provide education for local people (e.g. scholarships)	1	2	2	1	1	0.797NS
11	Improve services delivery for local people	1	1	2	2	1	0.142NS

Note: The effectiveness of new proposed compensation measures to improve conservation in the reserve were ranked by respondents as 2 (very positive) and -2 (very negative). The P-value corresponds to the Kruskal-Walls (KW) test, with the following levels of significance: NS = not significant, *= significant at 0.05, ** = significant at 0.01 and *** = significant at 0.001. Lower case letters in the line represent post-hoc statistical differences between clusters resulting from pairwise comparison; values with same letter are not statistically different.

Table 8. Improvement of environmental assets after the implementation of new, measures. overall and cluster medians (values in the brackets represents number of experts per clusters and its respective percentage).

Nº	Level of improvement with new measures	Clusters medians			Overall medians	P-Value
		N1 (23|41%)	N2 (19|35%)	N3 (13|24%)		
1	Increases of the biodiversity in general	4	3	4	3	0.054NS
2	Increases of forest cover	4a	2b	3a	3	0.000***
3	Increase of large carnivores and herbivores	3	2	2	2	0.315NS
4	Increment of fish stocks	3	2	2	2	0.365NS
5	Increase of large aquatic animals	3a	1b	2ab	2	0.017*
6	Reduction of degraded area due to cut and burn agriculture	3a	2b	3b	3	0.000***
7	Reduction of degraded area due to extraction of non-timber	3a	2b	2ab	3	0.002**

Note: the level of improvement with implementation of new compensation measures were ranked by experts as 0=0% to 4= [75 -100%] for biodiversity attributes. The P-value corresponds to the Kruskal-Walls (KW) test, with the following levels of significance: NS = not significant, *= significant at 0.05, ** = significant at 0.01 and *** = significant at 0.001. Lower case letters in the line represent post-hoc statistical differences between clusters resulting from pairwise comparison; values with same letter

Table 9. Improvement of human behaviour toward conservation, after the implementation of new, measures. overall and cluster medians (values in the brackets represents number of experts per clusters and its respective percentage).

N°	Level of improvement with new measures	Clusters medians			Overall medians	P-Value
		N1 (23|41%)	N2 (19|35%)	N3 (13|24%)		
1	Reduction of local people engaged in illegal activities	3	3	3	3	0.839NS
2	Reduction of unsustainable trophy hunting	2	3	1	2	0.587NS
3	Reduction of illegal bushmeat	3	3	2	3	0.232NS
4	Knowledge of local communities regarding the importance of conservation	4a	4a	2b	3	0.000***
5	Motivation of local people in conservation	4a	3a	2b	3	0.000***
6	Disclosure of offenders	3a	3a	1b	3	0.000***
7	Mutual respect and trustiness amongst all actors	3b	3a	2a	3	0.000***
8	Increase of local people employed in the reserve	3a	2ab	2b	3	0.011*
9	Reduction of human and wildlife conflicts	3b	2a	2a	2	0.000***
10	Reduction of frequency and forest fires intensity	3b	2a	2a	3	0.000***

Note: the level of improvement with implementation of new compensation measures were ranked by experts as 0=Null to 4=Very high for human behaviour attributes. The P-value corresponds to the Kruskal-Walls (KW) test, with the following levels of significance: NS = not significant, *= significant at 0.05, ** = significant at 0.01 and *** = significant at 0.001. Lower case letters in the line represent post-hoc statistical differences between clusters resulting from pairwise comparison; values with same letter

Table 10. Results from crosstabulation between different views of professionals who were clustered based on answers to four major themes

	Q.1	Q.2	Q.3	Q.4	Q.4.1
Q.1	-----	0.034* (0.014*)	0.000*** (0.000***)	0.101ns (0.096^{ns})	0.000*** (0.000***)
Q.2	------	-------	0.034* (0.014*)	0.095^{ns} (0.117^{ns})	0.226^{ns} (0.155^{ns})
Q.3	------	-------	-------	0.101^{ns} (0.117^{ns})	0.000*** (0.000***)
Q.4	------	------	-------	------	0.832^{ns} (0.846^{ns})
Q.4.1	------	------	------	------	------

Nota: Numbers into the brackets are p-value from the Fisher's Exact Test while out of brackets are α from Person Chi-square test. ns = not significant, * = significant at 0.05, ** = significant at 0.01 and *** = significant at 0.001

Q.1. Degree of threat that each of the existing problems in the reserve represents for conservation based on the experts scores.

Q.2. Reasons for local people involvement with practices that threaten conservation.

Q.3. Compensation measures that are currently placed in the reserve and its limitations.

Q.4. Cluster of proposed measures to improve conservation in the NNR.

Q.4.1. Level of environmental and human-related behaviour improvements after the implementation of new measures.

	4		**Results**	

	Threats	**Current Compensation**	**New Compensations**	**Level of Improvement**
Gender	0.375^{ns}	0.375^{ns}	0.160^{ns}	0.770^{ns}
	(0.406^{ns})	(0.406^{ns})	(0.147^{ns})	(0.770^{ns})
Field	0.935^{ns}	0.935^{ns}	0.071^{ns}	0.608^{ns}
	(0.943^{ns})	(0.943^{ns})	(0.070^{ns})	(0.534^{ns})
Education	0.244^{ns}	0.244^{ns}	0.250^{ns}	$0.004**$
	(0.195^{ns})	(0.195^{ns})	(0.315^{ns})	$(0.010**)$
Nº of visit	0.430^{ns}	0.430^{ns}	0.771^{ns}	0.397^{ns}
	(0.478^{ns})	(0.478^{ns})	(0.802^{ns})	(0.461^{ns})
Time Spend	0.110^{ns}	0.110^{ns}	0.623^{ns}	0.055^{ns}
	(0.074^{ns})	(0.074^{ns})	(0.502^{ns})	(0.054^{ns})
Objective	0.659^{ns}	0.659^{ns}	0.515^{ns}	0.542^{ns}
	(0.697^{ns})	(0.697^{ns})	(0.384^{ns})	(0.541^{ns})
Experience	(0.671^{ns})	0.671^{ns}	0.530^{ns}	0.658^{ns}
	(0.649^{ns})	(0.649^{ns})	(0.471^{ns})	(0.671^{ns})

Table 11: Crosstabulation with socio-demographic characteristics of respondents. Fisher's Exact Test into the brackets and out of brackets are α from Person Chi-square test. ns = not significant ns = not significant, *= significant at 0.05, ** = significant at 0.01 and *** = significant at 0.001

4 Results

		Lower & Intermediate	Upper Secondary School	Higher Education
Level of Improvement After Implementation of new Measures	**C1** Count	5	1	14
	Expected Count	5.5	2.2	12.4
	% within Ward Method	25.0%	5.0%	70.0%
	Adjusted Residual	-0.3	-1.1	0.9
	P (Zij)	0.7748	0.2880	0.3451
	C2 Count	4	5	4
	Expected Count	3.5	1.4	8.0
	% within Ward Method	30.8%	38.5%	30.8%
	Adjusted Residual	0.3	3.6	-2.6
	P (Zij)	0.7460	0.0003	0.0084
	C3 Count	6	0	16
	Expected Count	6.0	2.4	13.6
	% within Ward Method	27.3%	0.0%	72.7%
	Adjusted Residual	0.0	-2.1	1.4
	P (Zij)	1.0000	0.0341	0.1739

Table 12. Post Hoc cellwise tests between educations of respondents and improvement after implementation of new measures (based on the adjusted standard residuals Z_{ij}).

5 Conclusion

o **There are consensus among professionals that, most of the activities that threat conservation in the NNR** (poaching, illegal logging and illegal gold and ruby mining) **are mostly carried out by outsiders witch is in accordance with existing few literature**;

o **Responsibilities of actors in relation to the activities that threat conservation, were well distinguished by cluster**, this can be used to tackle each responsible with different measures/actions;

o **Experts agreed that, the new incentives are more appropriate than the existing ones**. Although some "existing incentives" are important, they need to readjusted in the way they are delivered to local people
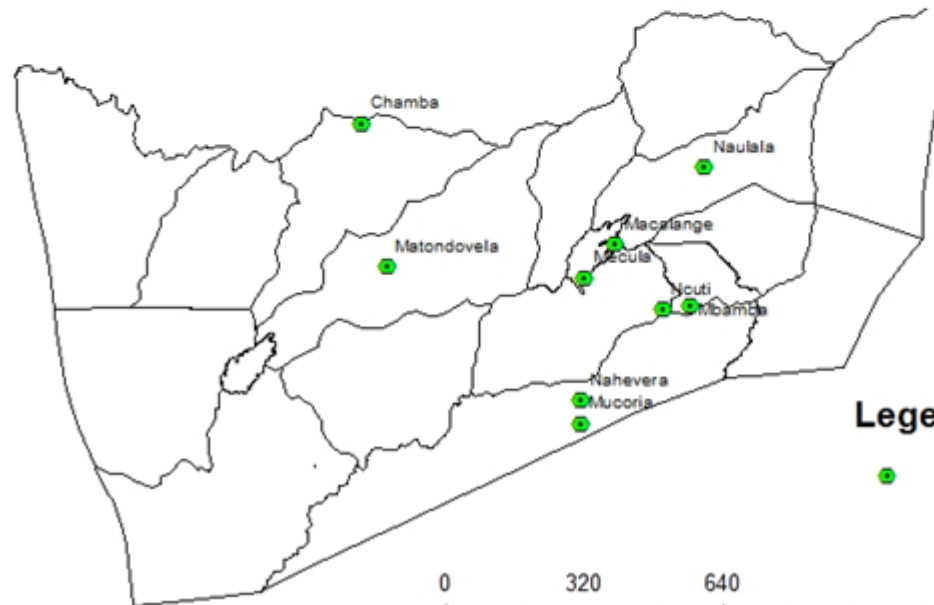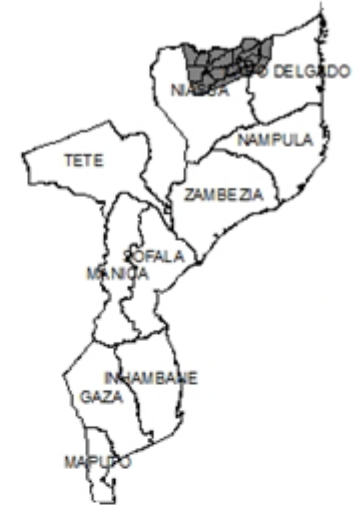
DATA COLLECTION BASED ON THE RESULTS FROM THE SURVEY TO EXPERTS

IN THE NIASSA NATONAL RESERVE

TETE
NIASSA
NAMPULA
ZAMBEZIA
SOFALA
MANICA
INHAMBANE
GAZA
MAPUTO
DELGADO

Chamba
Naulala
Macalange
Mecula
Ncuti
Mbamba
Nahevera
Mucoria
Matondovela

Legend

Survay Villages

0   320   640   1.280 Miles

Travel Grant to attend GEEF_2019

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Grant for field data collection in the Niassa Reserve 2016 – 2018

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