Comparative Valuation of Ecosystem Services Across Countries and Genders
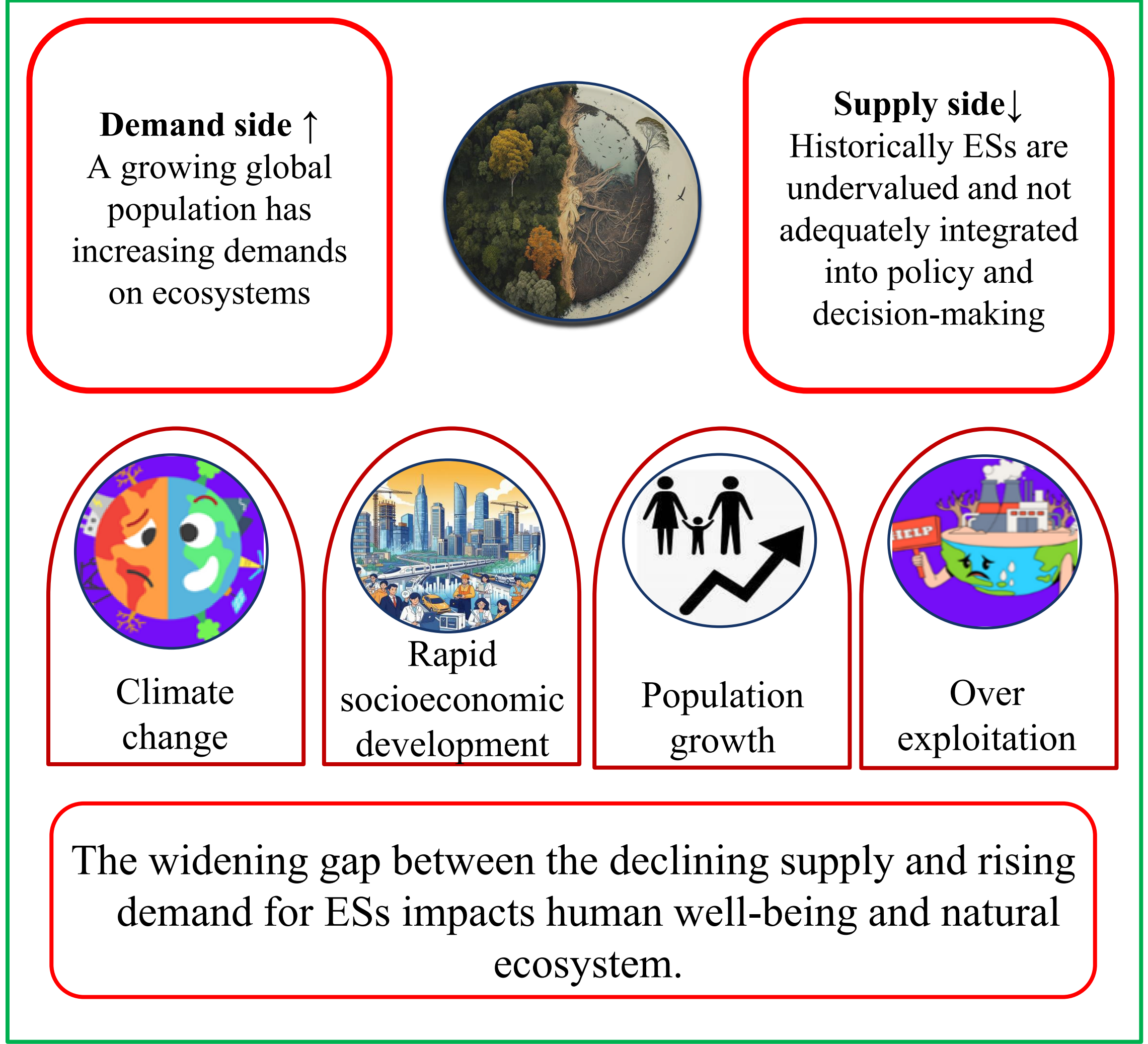
Background

Ecosystem services (ESs) are the benefits people obtain from ecosystems, offer both tangible resources and intangible services

➤ Only 0.7% ESs research considers gender

➤ Socio-demographic & cultural factors often ignored

➤ Need cross-country, comparative approach

Demand side ↑
A growing global population has increasing demands on ecosystems

Supply side↓
Historically ESs are undervalued and not adequately integrated into policy and decision-making

Climate change | Rapid socioeconomic development | Population growth | Over exploitation

The widening gap between the declining supply and rising demand for ESs impacts human well-being and natural ecosystem.

Research Goal

To gain nuanced insights into ES valuation through a rare multi-country, socio-demographic study with a focus on gender

Study roadmap and analytical steps

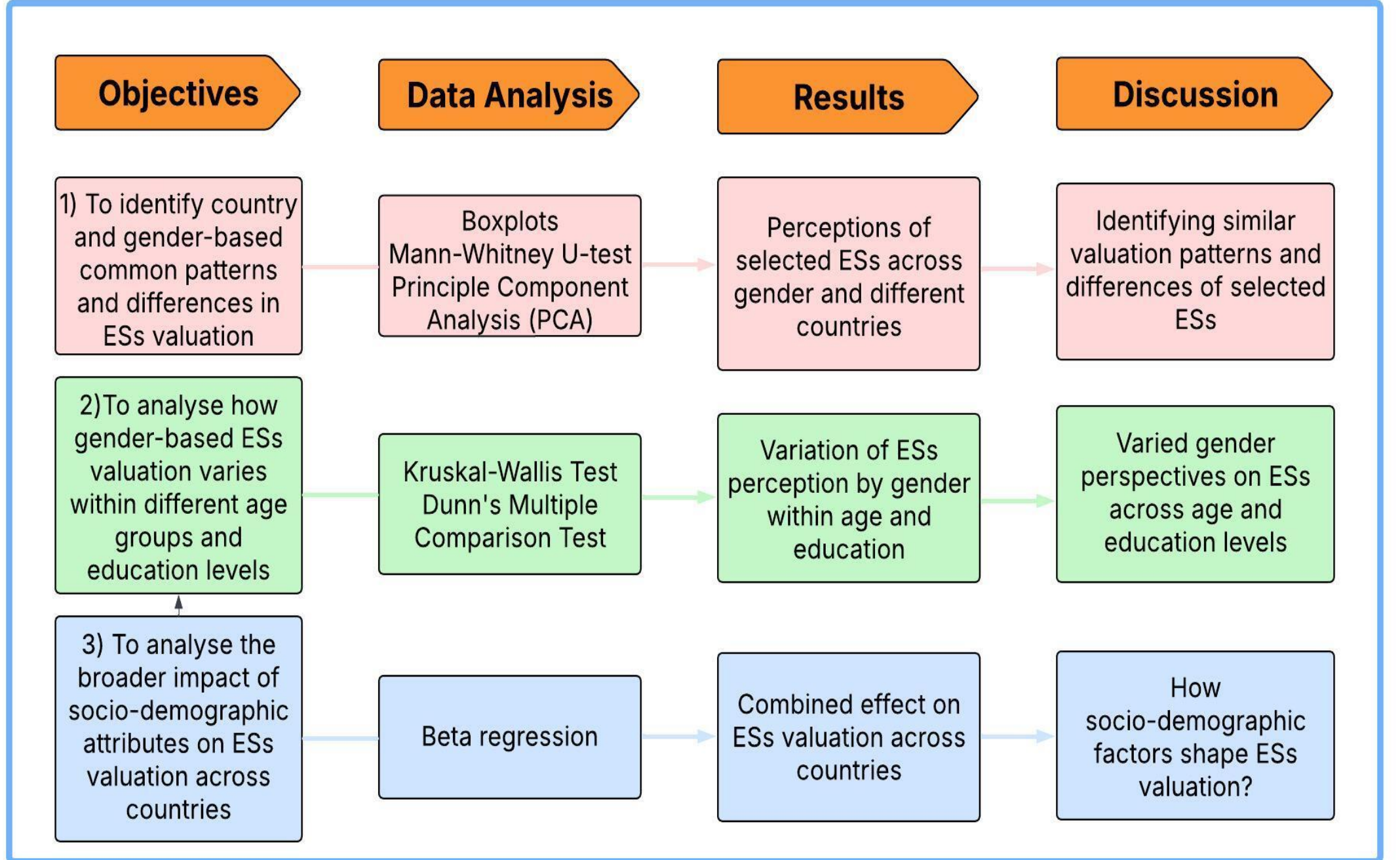| Study area	Type of ecosystems	Ecosystem services	Framework	Data collection methods
Brazil (Souza et al., 2024)	Watershed	6 Provisioning services; 12 Regulating and Supporting services; 8 Cultural services	The Millennium Ecosystem Assessment (2005)	Household survey/ questionnaires
Ethiopia	Semi-coffee forest	5 Provisioning services; 5 Regulating and Supporting services; 4 Cultural services	The Millennium Ecosystem Assessment (2005)	Household survey/ questionnaires
Namibia and Zambia	Forest	10 Provisioning services	The Millennium Ecosystem Assessment (2005)	Household survey/ questionnaires
Sudan	Forest	10 Provisioning services; 2 Regulating and Supporting services; 4 Cultural services	Common international classification for ES (CICES)	Household survey/ questionnaires

Table 1. Overview of characteristics of case studies across different countries

Conclusion

➤Valuation is context-specific and country-dependent

➤ES valuation is dynamic, shaped by social context - not fixed by gender

➤Country factors matter more than gender

Results

➤ Respondents: 550 people

➤ 55% are male and 44% are female

➤ Majority of respondents in both genders were aged 30-60 with secondary or tertiary education

	Brazil	Ethiopia	Namibia	Sudan	Zambia	Total (percentage)
Female	37	39	56	45	71	44.7
Male	44	81	43	105	33	55.2

Table.2. Sociodemographic Profile of Respondents

(a)

(b)
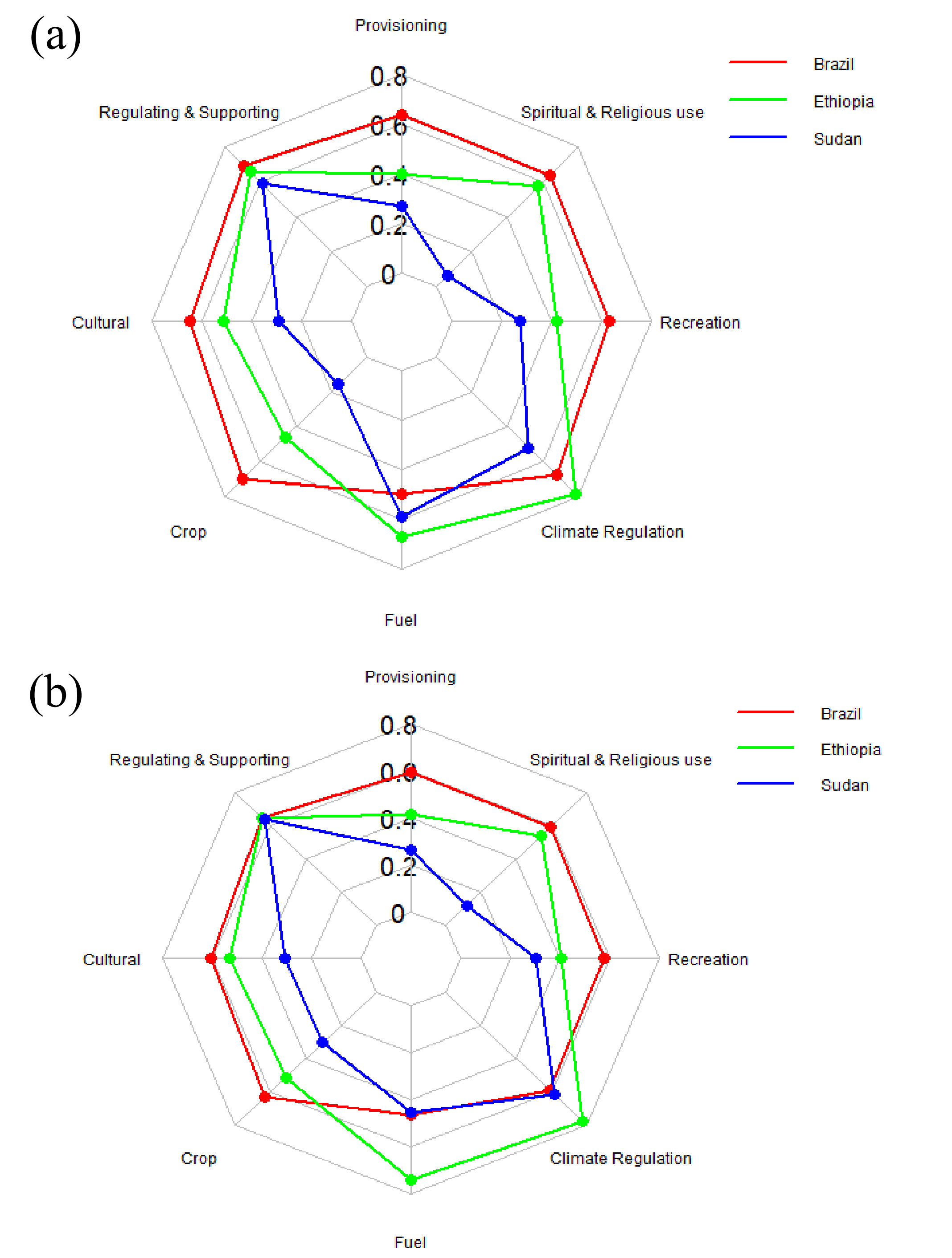
Figure.1. Comparative valuation of aggregated and individual ESs perceived by females (a) and males (b)

Predictor	Crop		Fuel resources		Climate regulation		Recreation		Spiritual & Religious	
	β±SE	P	β±SE	P	β±SE	P	β±SE	P	β±SE	P
Gender (Male)	0.08 ± 0.12	0.51	-0.15 ± 0.13	0.23	0.05 ± 0.18	0.76	-0.09 ± 0.19	0.61	0.05 ± 0.18	0.78
AgeGroup										
30-44	0.08 ± 0.12	0.51	0.28 ± 0.16	0.08	0.57 ± 0.28	0.04*	0.31 ± 0.28	0.28	0.14 ± 0.25	0.57
45-60	0.11 ± 0.16	0.51	0.00003 ± 0.17	0.99	0.58 ± 0.27	0.04*	0.44 ± 0.28	0.12	0.02 ± 0.25	0.92
60+	0.38 ± 0.23	0.11	-0.14 ± 0.24	0.56	0.11 ± 0.38	0.78	-0.22 ± 0.37	0.55	-0.01 ± 0.34	0.95
Education										
Primary	0.44 ± 0.20	0.03*	-0.35 ± 0.20	0.08	0.18 ± 0.25	0.47	0.46 ± 0.25	0.06	0.22 ± 0.23	0.32
Secondary	0.29 ± 0.23	0.21	-0.63 ± 0.23	0.006**	0.51 ± 0.32	0.11	0.49 ± 0.33	0.13	-0.04 ± 0.29	0.88
Tertiary	0.46 ± 0.25	0.06	-0.44 ± 0.25	0.07	0.86 ± 0.27	0.009**	0.87 ± 0.29	0.01*	0.47 ± 0.29	0.13
Country										
Namibia	0.52 ± 0.19	0.008**	1.22 ± 0.20	<0.001***	-	-	-	-	-	-
Sudan	-1.84 ± 0.24	<0.001***	-0.19 ± 0.23	0.41	0.29 ± 0.27	0.29	-0.91 ± 0.29	0.002**	-2.49 ± 0.29	<0.001***
Zambia	0.62 ± 0.21	0.003**	1.38 ± 0.22	<0.01***	-	-	-	-	-	-

Table.3. Impact of Socio-Demographic Status on the Valuation of individual ESs across different countries

Figure.2. PCA biplots by country and gender

➤Brazil → Equal valuation across genders

➤Ethiopia & Sudan → Climate & fuel prioritized by both genders

➤All countries → Cultural ESs undervalued

➤Sudan → Males value a wider range of ESs

➤Gender → Not significant

➤Age → Moderate effect

➤Education → Primary/secondary ↑ crop & fuel; Tertiary ↑ climate & recreation

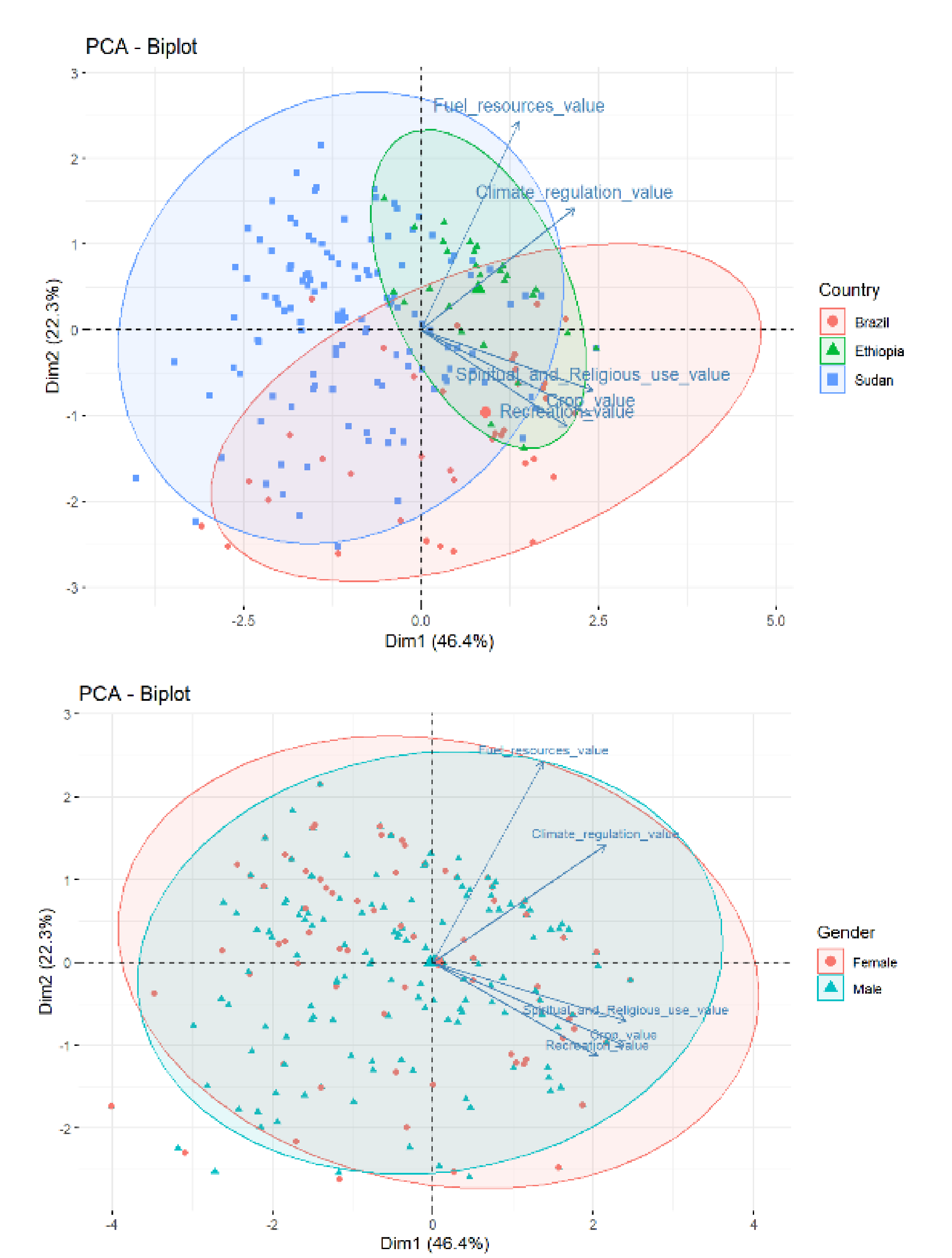➤Country → Namibia & Zambia ↑ crop & fuel; Sudan ↓ crop, recreation, spiritual services

➤ Brazil: Homogeneous valuation

➤ Ethiopia: Moderate, balanced valuation

➤ Sudan: Highest variability; partial overlap with Ethiopia

➤ Gender: Strong ellipse overlap → not a main driver

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