

Mapping the Ecosystem Services in Sembilang-Dangku Landscape, South Sumatra

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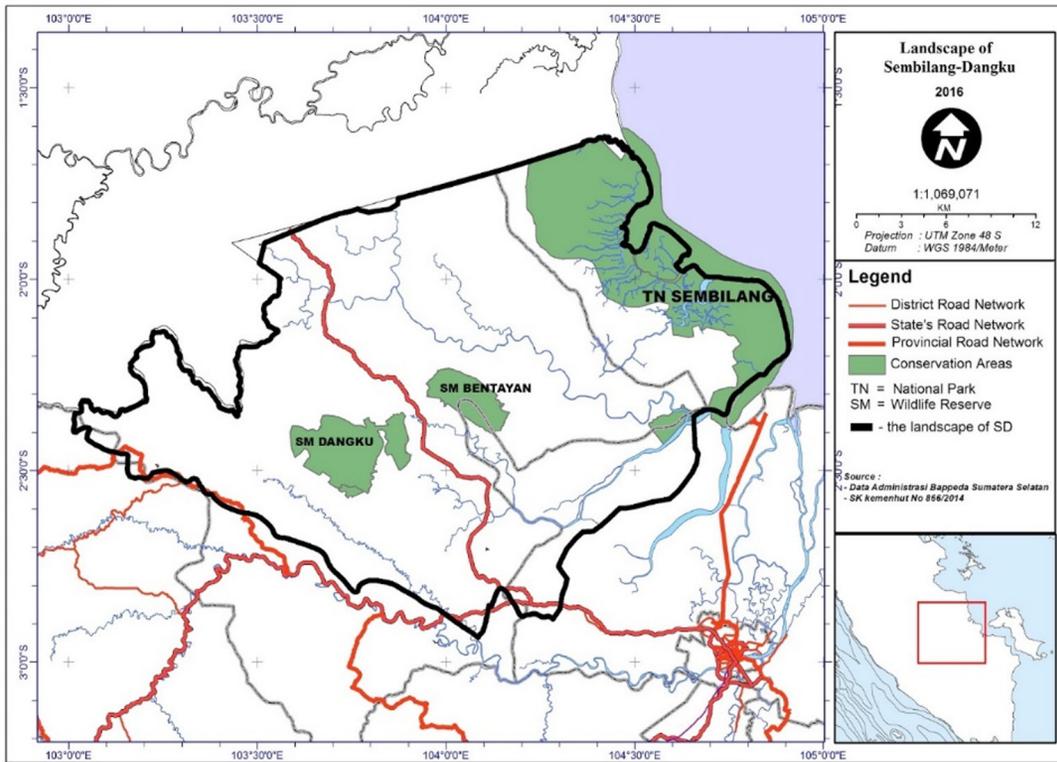
Natural areas such as forests provide important goods and services to the people, forests supply timber and wood fiber, provide and regulate water resources, provide genetic resources for medicines, and place for recreation/ tourism. There are benefits that people obtain from ecosystems are known as ecosystem services (ES). An initial attempt to identify the types of ES available in South Sumatra region, particularly in the landscape of Sembilang-Dangku

ES assessment could represent the ES complexity, at appropriate spatial scales, but are not so costly or

time-consuming. The approach that stroke a balance between the inherent ES complexity and the need for practical approaches by:

1. identifying a key set of ES to include in the analysis, tailored to the local context
2. relying on available tabular and spatial data
3. requiring rapid, relatively simple analyses.

This approach was applied to assess key provisioning, regulating, and cultural services provided in Sembilang-Dangku landscape, where a high level of human dependence on ecosystems occurs.



The Sembilang-Dangku landscape

METHODOLOGY

This study covered only a landscape of Sembilang and Dangku, which covers part of Musi Banyuasin and Banyuasin districts. This area also has the two protected forest areas to the west – Dangku and Bentayan wildlife reserves under the management of the regional conservation office (BKSDA).

ES Identification

Ecosystem services are now broadly understood as the contributions that ecosystems make to human well-being. In this study, there are 13 ES are considered as important for the livelihood of local people and the economic development in the district and the province.

Ecosystem services and their key beneficiaries analyzed in this study

ES category	ES sub-category	ES benefit domain	Beneficiaries		
			Private (large companies, SMEs, smallholders with hired labor)	Public (government agencies at various levels; global communities)	Household
Provisioning	Tr agriculture	1. Paddy pr			Paddy farmer
		2. Rubber pr			Rubber farmer
		3. Crop pr (vegetables, fruits, etc.)			Local community
	Intensive agriculture	4. Oil palm pr	Oil palm companies		Plasma farmers
			Independent small-holders		Local community
	Forest harves	5. Pulp & paper materials	HTI companies	Government at district, provincial, and national level	Local community
	Fisheries	6.			Loc
		7. Fresh wat			Local community
	Water supply	8. Drinking water			Local community
		9. Sanitary etc.			Local community
Media of transporta-	10. River transporta	All companies that need river networks for products	Government at district and provincial levels	Local community	
Regulating	Climate regula	11. CO ₂ sequestra		Government at district, provincial, and national levels; Global community	Local community at the village
	Flood regula	12. Pea		Government at district and provincial levels	Local community at the village
Cultural		13. Recrea duca (Sembilang area)		Government at district and provincial levels	Local community at the village

Mapping Methods

All the maps were created using ESRI ArcGIS software (version 10.1). Total of 18 habitat classes were used in the analysis. Cloud was identified as 'no data available' for the image pixel covered with cloud. Each habitat (or land cover class) was given a score for each service that it could potentially serve as follows:

- Habitat has high importance for the service = 3
- Habitat is of medium importance for the service = 2
- Habitat is of low importance for the service = 1
- Habitat has no importance for the service = 0

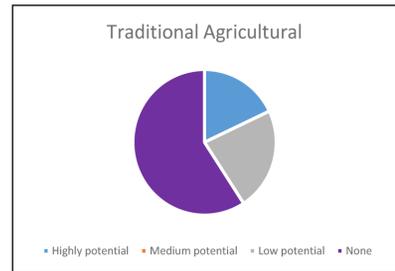
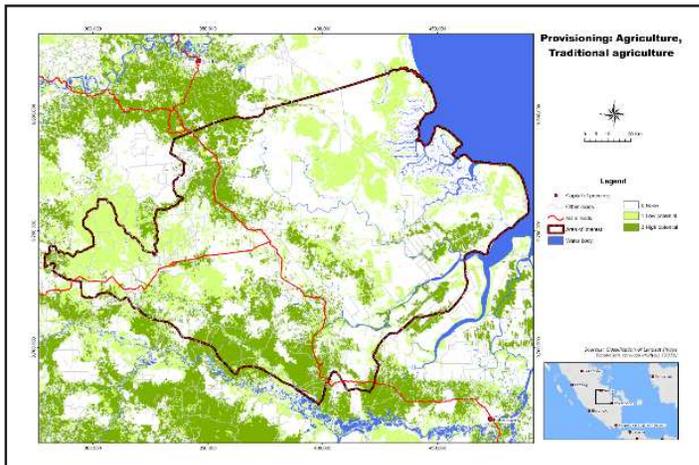
ES IN THE SEMBILANG-DANGKU LANDSCAPE

Ecosystem services are the direct and indirect contributions of ecosystems to human well-being for our survival and quality of life. According to TEEB, ecosystem services can be categorized in three main types:

	Provisioning services	Regulating services	Cultural services
1.	food	1. climate regula	1. spiritual enrichment
2.	fresh water	2. natural hazard regula	2. intellectual development
3.	wood	3. wate	3. recrea
4.		4. waste management	4. aesthe alues
5.	genesources	5. pollution control	
6.	medicines		

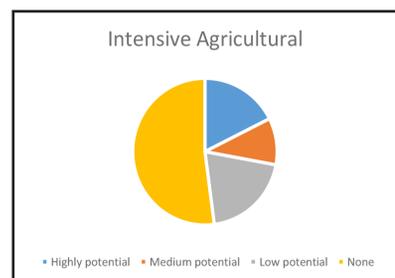
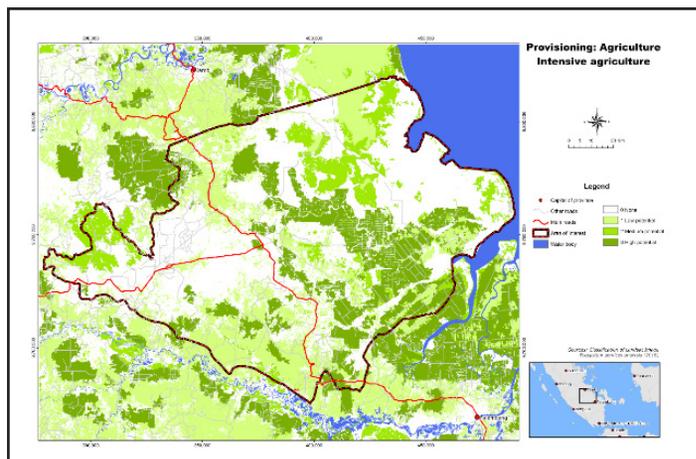
1. Provisioning: Traditional agriculture

All agriculture areas (dryland agriculture with scrubs, dryland agriculture, and wetland-agriculture) are considered to have high potential provisioning service for traditional agriculture. In addition, some habitat types (such as dryland forest, degraded forest, swamp with scrub, and grassland/sedges) could also potentially provide patches of areas for traditional agriculture. From the table below, it appears that the most potential areas could only cover 17.89% of the total landscape, and low potential service covers 22.84%, while the remaining areas of the landscape has no potential of providing this service.



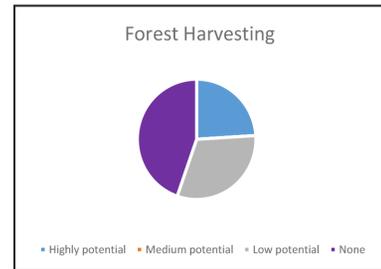
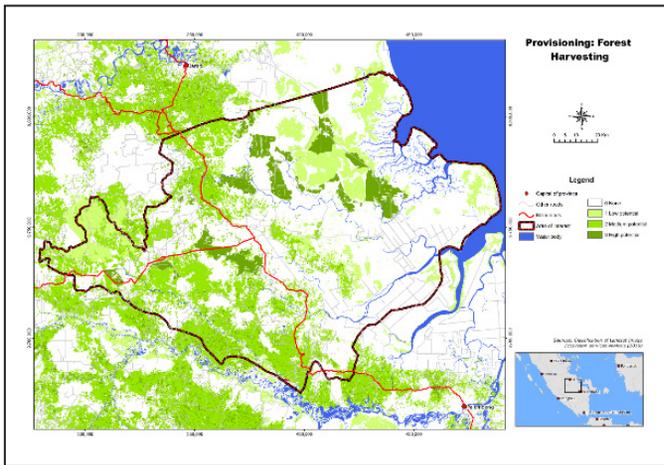
2. Provisioning: Intensive agriculture

The main areas providing intensive agriculture in the landscape is palm oil plantation areas, while smallholder farmers might also utilize areas of dryland forest, swamp with scrub, swamp forest, dryland agriculture with scrubs, dryland agriculture, and wetland agriculture for their palm oil plantation. From the table below, it appears that the highest potential area for this service covers 17.59% of the total landscape area, the medium area covers 10.31%, and low potential area is 20.04%.



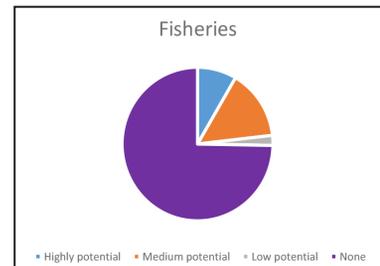
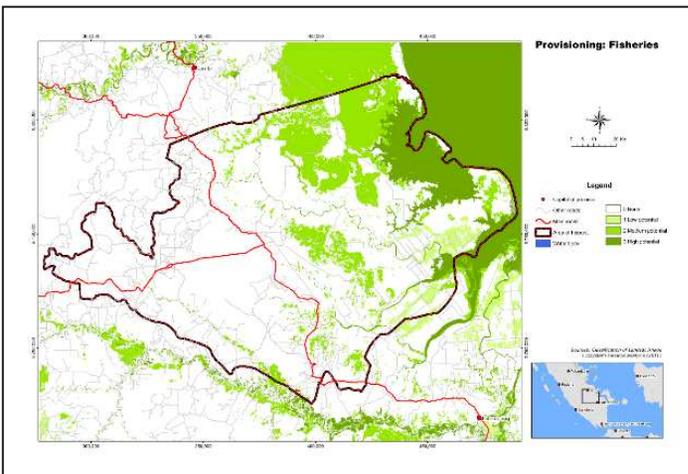
3. Provisioning: Forest harvesting

The areas of industrial forest plantation (*in Bahasa Indonesia: Hutan Tanaman Industri, abb. HTI*) are the main source of this service. While other areas such as dryland forest, degraded forest, swamp with scrub, dryland agriculture with scrubs, dryland agriculture, and even oil palm plantation areas might have a low potential as the service providers. From the table below, it appears that only 24.01% of the landscape area currently provides this service, although 31.31% of the landscape has low potency in providing the service.



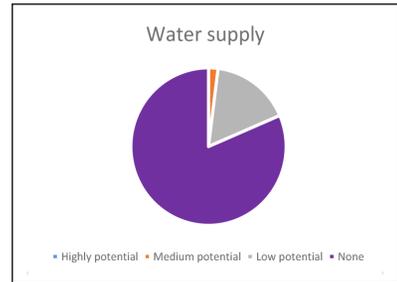
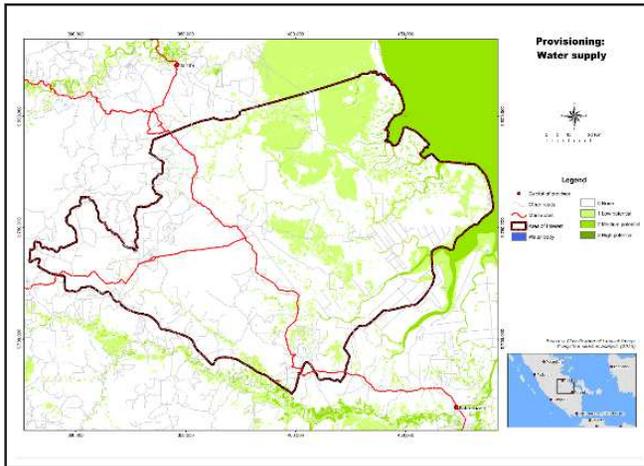
4. Provisioning: Fisheries

All the mangrove areas are considered as the center of fish spawning ground with high values of fisheries. Other important areas are water body and ponds. All swamp areas are considered to also be important but less than mangroves, while wetland agriculture is of the least importance.



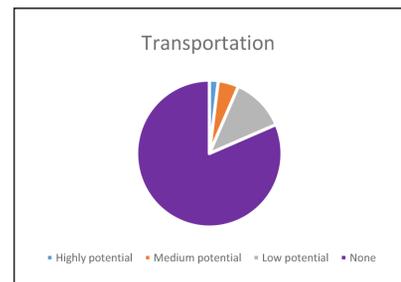
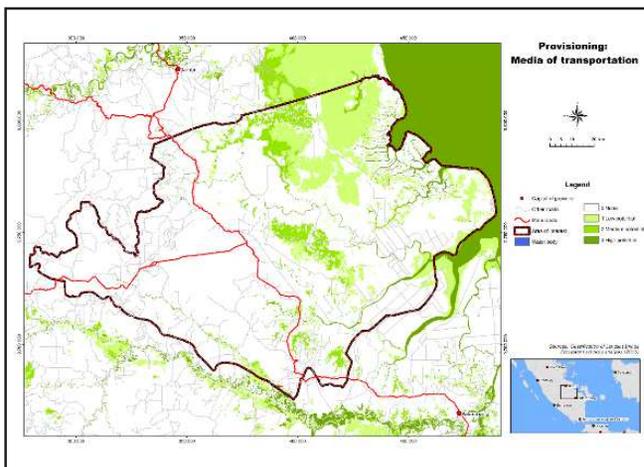
5. Provisioning: Water supply

Water body is considered as the main area in providing this service although the main source of water supply in the landscape has always been the rain water, on which people collect the rain water for their daily needs, while other areas such as mangrove forest low density, swamp forest, swamp with scrub, and swamp are considered as the supporting areas in providing water supply in the landscape. From the table below, it appears that the landscape has a very limited potential for providing the service.



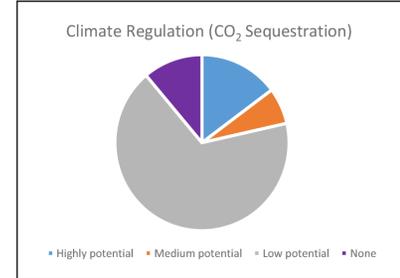
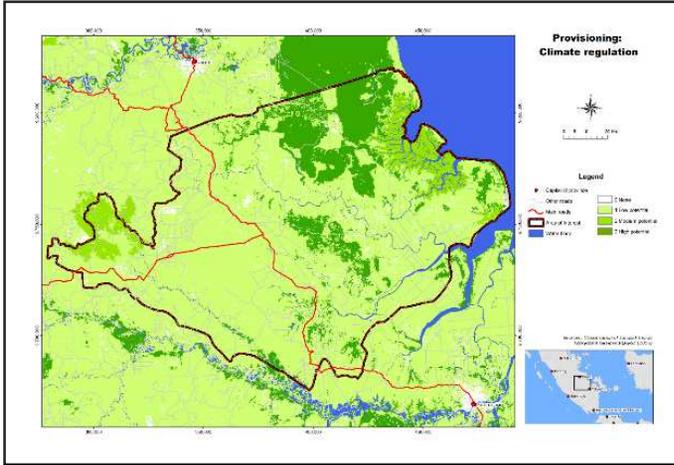
6. Provisioning: Transportation

Beyond doubt, the rivers in this landscape are still being utilized as the main infrastructure for local transportation, and hence the rivers (or water body) provide the crucial service for the local livelihood. The other wetland areas support providing this service. From the table below, it appears that only 1.99% of the total landscape area has a very high potential in providing the service, which is followed with medium potential areas (4.57%) and low potential areas (11.98%).



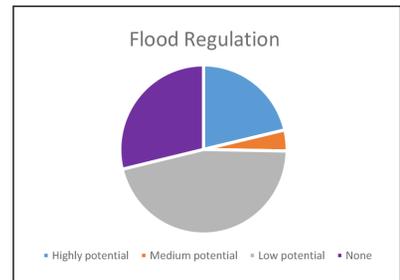
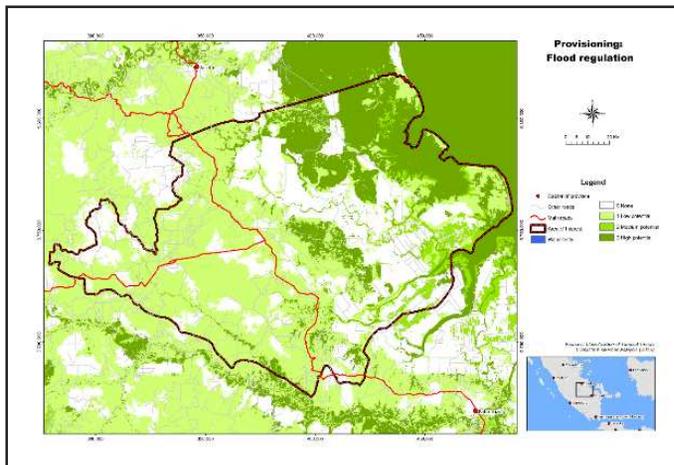
7. Regulating: Climate regulation (CO₂ sequestration)

Almost all habitat types provide this service with different degrees of potencies. Almost all swamp forests are peatlands, which are the main elements in regulating CO₂ sequestration. Dryland forest and mangroves also provide this service, while the other landscape elements are considered to provide this service in low potential degree. From the table below, it appears that 14.77% of the landscape has high potential for this service, which is followed with 6.69% of medium potential areas, and 67.42% of low potential areas.



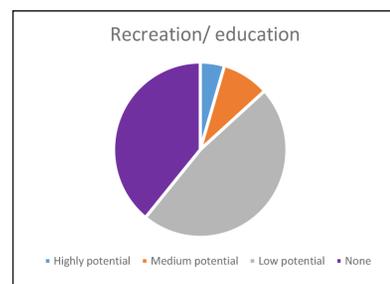
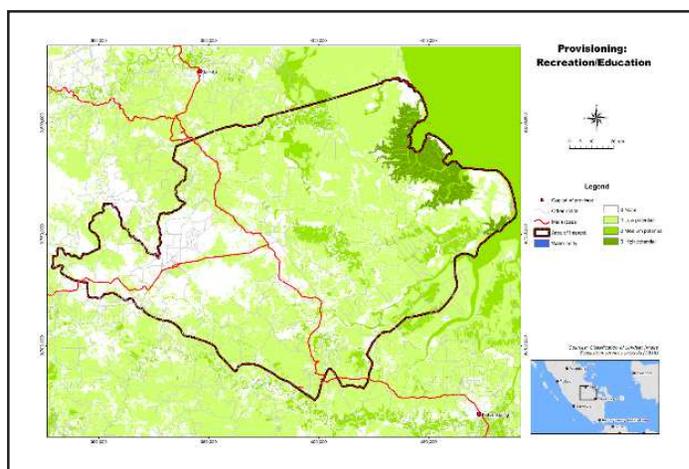
8. Regulating: Flood regulation

Almost all habitat types provide this service with different degrees of potencies. Such habitats as mangrove forest of high density, swamp forest, swamp with scrub, swamp, and water body area considered to be the most important areas for regulating flood. While such areas as mangrove forest of low density, ponds, and wetland agriculture are considered to have medium potencies in providing the service. From the table below, it appears that 21.29% of the landscape area provide highly potential areas for this service, which is followed with medium potential areas (4.01%) and low potential areas (45.94%).



9. Cultural: Recreation/education

There has been no report on the important sites in providing cultural services. The most distinct element of cultural service is the sites or habitats for recreation or education purposes, such as Berbak-Sembilang National Park (Sembilang side). Mangrove forest of high density, where Sembilang area resides, is highly potential area for providing the service. Other areas such as swamps (peatlands), water body (rivers), ponds, and wetland agriculture are also considered to provide this service. While other habitat types are reckoned to support the landscape in providing the service. From the table below, it appears that the highly potential areas for this service only cover 4.52% of the landscape, while the medium potential areas cover 8.79% and the supporting areas cover 47.60% of the landscape.



END NOTES

Currently, a total of 9 types of ecosystem services are identified in the landscape of Sembilang-Dangku. Regardless to limited availability of spatial data may have compromised the identification efforts. Except the recreational/ educational value, all the other service types have direct values to the local communities suggesting that the local people are very dependent on the ecosystem.

The KCA (key-conservation area) in the landscape are Sembilang National Park, Dangku Wildlife Reserve, and Bentayan Wildlife Reserve. Wildlife reserve has been destroyed by encroachment and settlement making it not feasible anymore as a wildlife reserve. There are 5 KBA (Key Biodiversity Area) in South Sumatra, and three are in the Sembilang-Dangku landscape, namely: Meranti Forest, Merang Peatlands, and Sembilang River. Identifying and managing the landscape's natural assets and their services could support both conservation and sustainable development goals.

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ANNEX. Potential areas of each ES category of total landscape

	Potential area (hectar)								
	Provisioning						Regulating		Cultural
	Traditional Agricultural	Intensive Agricultural	Forest Harvesting	Fisheries	Water supply	Transportation	Climate Regulation (CO ₂ Sequestration)	Flood Regulation	Recreation/ education
Highly potential	287,735.49	281,418.30	384,197.22	134,542.89	0,00	31,859.46	236,411.01	340,636.86	72,366.39
Medium potential	0,00	165,036.96	0,00	236,411.01	31,859.46	73,152.36	107,026.83	64,135.89	140,686.02
Low potential	365,554.44	320,617.62	501,017.31	33,818.85	264,872.70	191,720.34	1,078,927.74	735,228.90	761,715.72
None	946,995.84	833,212.89	715,071.24	1,195,513.02	1,303,553.61	1,303,553.61	177,920.19	460,284.12	625,517.64

Proyek **KELOLA Sendang** adalah bentuk kemitraan antara publik, swasta dan masyarakat untuk mewujudkan pengelolaan lanskap yang berkelanjutan. Proyek ini merupakan bentuk dukungan bagi Pemerintah Provinsi Sumatera Selatan untuk mewujudkan visi pertumbuhan hijau (*green-growth*). Proyek bertujuan untuk mendorong kerjasama para pihak dalam menyeimbangkan kepentingan produksi dan konservasi melalui pengelolaan lanskap terpadu. Proyek memfasilitasi perencanaan, kerangka kerja dan aksi kolaboratif untuk melestarikan keanekaragaman hayati dan konservasi hutan, mengembangkan praktik terbaik ramah lingkungan bagi pengelola lahan dari sektor publik dan swasta, serta memperkuat penghidupan masyarakat. Proyek akan berkontribusi bagi upaya mengatasi masalah lingkungan hidup seperti kebakaran hutan dan lahan, degradasi hutan dan keanekaragaman hayati, kerusakan lahan gambut serta mendorong penurunan emisi gas rumah kaca.

Proyek **KELOLA Sendang** diinisiasi oleh *Zoological Society of London (ZSL)* bersama para mitra yaitu *Forest People Program (FPP)*, *Deltares*, *Daemeter Consulting*, *SNV* dan *IDH Trade Initiative*, dan didukung oleh Pemerintah Provinsi Sumatera Selatan, *British Embassy* melalui *UK Climate Change Unit (UKCCU)*, *The Norwegian Government* dan *The David and Lucile Packard Foundation*.

