MILLENIUM CHALLENGE ACCOUNT – INDONESIA
GREEN PROSPERITY
PARTICIPATORY LAND USE PLANNING

GENERAL TECHNICAL
VILLAGE BOUNDARY SETTING (VBS)
GUIDELINE

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ABBREVIATION/ACRONYM/GLOSSARY

ADD	*Alokasi Dana Desa* – Village Fund Allocation
AMAN	*Aliansi Masyarakat Adat Nusantara* – Indonesian Alliance of Indigenous Peoples
APBD	*Anggaran Pendapatan dan Belanja Daerah* – Regional Budget
APBN	*Anggaran Pendapatan dan Belanja Negara* –National Budget
Bappeda	*Badan Pembangunan danPerencanaan Daerah* – Regional Development Planning Office
BPD	*Badan Permusyawaratan Desa* – Village Consultative Body
BPMPD	*Badan Pemberdayaan Masyarakatdan Pemerintah Desa* – Office for the Empowerment of Village Communities and Governments
BPN	*Badan Pertanahan Nasional* – National Land Agency
CORS	Continuously Operating Reference Station
Desa	Village (the smallest territorial unit that has the autonomy to manage itself)
GIS	Geographical Information System, a computer based spatial information processing system
GNSS	Global Navigation Satellite System
GP	Green Prosperity
GPS	Global Positioning System, a system to determine geographical coordinates of the earth surface using a network of navigation satellites
IDR	Indonesian rupiah
Kampung	indigenous village
Kecamatan	Sub-district (government territorial unit coordinating a number of villages)
Lurah	Head of Kelurahan (an appointed position selected from civil servants)
MCA-I	Millennium Challenge Account – Indonesia
MCC	Millennium Challenge Corporation
MOHA	Ministry of Home Affairs
NGO	Non-Governmental Organization
PBA	*Pilar Batas Antara* – Intermediate Boundary Pillar
PBU	*Pilar Batas Utama* – Main Boundary Pillar
Permendagri	*Peraturan Menteri Dalam Negeri* – Minister of Home Affairs Regulation
PKB	*Pilar Kontrol Bata* – Boundary Control Pillar
PLUP	Participatory Land Use Planning
PPBAK	*Forum Penyelesaian Perselihan Batas AntarKecamatan, Kabupaten dan Provinsi* – Sub-district, District and Provincial Inter-Boundary Dispute Settlement Forum
PPBK	*Forum Penyelesaian Perselisihan Batas Kecamatan* – Sub-district Boundary Dispute Settlement Forum
SKPD	*Satuan Kerja Perangkat Daerah* – Regional Government Working Unit
SNI	*Standar Nasional Indonesia* – Indonesian National Standard
UAS	Unmanned Aerial System
UAV	Unmanned Aerial Vehicle
UTM	Universal Transverse Mercator

Introduction

This document on village boundary setting is meant as a general guide in implementing the Participatory Land Use Planning (PLUP) Participatory Village Boundary Setting and Community Mapping (Participatory VBS/CM) process as a part of the Green Prosperity (GP) Project in Indonesia. These general guidelines were developed as the result of a thorough investigation and analysis of the Ministry of Home Affairs Regulations, previous and on-going experiences in village boundary setting and community mapping exercise in Indonesia and lessons learned gleaned from other similar exercises outside of Indonesia. These general technical guidelines are intended to provide a basis from which specific boundary setting and community mapping of critical cultural and natural resources will take under the PLUP Activity of the MCA-Indonesia's GP Project.

Village boundary setting is an important element and in many ways is the first step in participatory land use planning at the village level. Clear and indisputable village boundaries give a basis for villages to undertake land use planning, for the mapping of land ownership boundaries, and for utilizing village communal rights. They also provide a factual reality and basis for spatial data integration at national, provincial and district levels.

Village boundary setting in Indonesia has progressed very slowly, while investments, particularly in natural resource use and or extraction, have penetrated villages rapidly. Local governments do not generally consider village boundaries as a priority, preferring to focus on provincial and district boundaries instead. However, once the borders between villages are clear, then the boundaries between districts and provinces will also become clear. Consequently, a breakthrough is needed to accelerate village boundary setting while overcoming obstacles such as timing and high costs. Based on Indonesia's experience in implementing participatory mapping, boundary mapping can be done more cheaply and quickly when the process involves many parties.

Mapping village boundaries should not be seen simply as a technical activity performed by surveyors and cartographers (i.e. cartography). Mapping boundaries at the village level is actually a very complex socialactivity (not technical). Several non-technical (i.e. non-cartographic) tasks are involved, ranging from fundraising and fund management to organizing people at every stage of the activity (including workshops and field phases), logistics (travel, meals and lodging), communication with various parties at village and government levels, and managing the various teams during the mapping activity.

So, while cartography is an important component, it is one of many. The key issue to be addressed is how all of these components can be integrated and managed. Although there is always a strong temptation to get on with activity as soon as possible, sufficient time needs to be dedicated to the social process to ensure that all parties involved have a shared vision on the objectives and process of establishing village boundaries, and on how the maps that are produced will be used.

With that background, this guideline is intended for people with basic knowledge of mapping and surveys, for decision makers in government units from the village up to the district level, and for relevant NGOs. Users of this guideline should be able to apply the methodology directly, without substantial assistance from outside parties.

In preparing this guideline, the writers assume that district governments intending to engage with the GP Project plan to accelerate village border planning throughout their jurisdiction, or at least in the sub-districts that have been selected for GP project implementation. Villages that have already conducted boundary setting, and have already generated data and maps from this exercise, may skip the relevant stages. The approach should be applied to *all* villages in a particular prioritysub-district, not just isolated villages.

Before going into the methodology, we first explain the key terminology used throughout this book.

Delineation and Demarcation of Village Boundaries

In Minister of Home Affairs Regulation (*Permendagri*) No. 27 of 2006 (Regulation 27), Indonesia's Ministry of Home Affairs (MOHA) distinguishes between *delineation* and *demarcation* in the process of setting administrative territorial boundaries. Delineation is setting the boundaries *on a map*, which is known as cartometric boundary setting. Demarcation is putting up boundary signs and markers *in the field*. These two terms are defined by Regulation 27 as follows:

- Delineation: "the process of setting village boundaries cartometrically on an agreed base map"

●   Demarcation: "the process of implementation in the field by marking the village boundaries based on the results of the delineation"

In line with these two definitions, delineation is a legal process (consensus building) to establish an agreement between adjacent villages, while demarcation is a technical process that translates the consensus into boundary markers and geodetic coordinate points. Regulation 27 states that determining village boundaries consists of research on boundary documents, determining the base map used, and making the boundary lines cartometrically on the base map (Article 3). Meanwhile, boundary demarcation involves determining the boundary setting documents, surveying the boundaries, constructing boundary markers along the boundaries, measuring and positioning the boundary markers, and mapping the boundaries (Article 4, paragraph 1). The activities described in Regulation 27 all concern mapping techniques, rather than the process of reaching consensus.

However, boundary setting has high potential for dispute since it tends to invoke various claims from governments, companies (especially concessionaires), and local communities; the history of the community and its governance system; and community identity. Since earnest effort is needed to manage disputes so that all parties are treated fairly, the boundary delineation stage needs to be more robust. Participatory mapping methodology can help ensure that these complex social processes are handled properly and inclusively.

Participatory Mapping

Participatory mapping is a method that allows local communities to use the power of maps and even to become mapmakers able to show their existence in a location and their perspectives on the space they use. One of the main reasons for using this method is that local people know their own territory best, and have an interest in developing and maintaining their territory. The essence of this method is making maps through a process of dialogue between local communities and facilitators, who assist them in the mapmaking exercise. The community has two roles – both mapmaker and map user – since participatory mapping is about, by and for the community. The facilitator's role is to translate the mental map (knowledge of a territory held in one's memory) of a community into a map that meets cartographic standards. With mapping technology becoming easier to use – through the introduction of global positioning systems (GPS), geographic information systems (GIS) and remote sensing – it is now possible for common people to undertake mapping, which previously could only be done by experts.

Based on lessons learned in participatory mapping, it can be used to achieve a range of objectives:

- Organize the community
- Preserve and strengthen local/traditional knowledge;
- Gain recognition on resource rights;
- Determine traditional territorial boundaries;
- Enhance the community's capacity to manage and protect its territory;
- Support the process of settling disputes over space;
- Increase and mobilize local awareness on environment issues;
- Improve local capacity in relation to external organizations; and
- Allow local and global groups to cooperate and complement each other in biodiversity conservation programs.

So participatory mapping is not only used to delineate boundaries, it also helps a community to understand and make plans for the region – which plays an important part in participatory spatial planning implemented by the GP Program.

Boundaries

The concept of boundaries is essentially a way to communicate messages about the claims of a person or a group over a space (territory). A claim over a territory should be clear to everyone, especially those outside the group. This allows the maker of the claim to gain recognition from other parties, claim control over the traffic of people and goods into the territory claimed, and defend and protect the area. So boundary maintenance is essential, as it allows the inhabitants and users of a geographic area to utilize the resources within its boundaries with a degree of security. Further, since boundaries involve relationships between people concerning the utilization of space, boundaries are a social issue that must be handled with great caution.

The concept of boundaries is not uniform, however. In contemporary society, a boundary is a fixed line that is narrow and has formal legal implications. This is particularly evident in the fence around a house (especially in urban areas), which physically separates the space claimed by a person or a group from the space outside the fence. But in rural communities, especially among indigenous peoples, the boundary is not a rigid line, rather it is more fluid. Often it takes the form of a belt area, such as a forest, garden or ridge. This may change as current mapping technologies (which are becoming an important part of village boundary setting) emphasize boundaries as lines. This may eventually lead to rural communities defining boundaries as walls. Consequently, special effort must be made to discuss the concept of the boundary so as to avoid new disputes arising in the future.

In village society, a clear boundary agreement is generally found in areas in which customary institutions are still strong. These agreements are generally in oral form and known only by a few village elders. If there is no special effort to pass on the knowledge to the next generation, this knowledge will be lost and no one else will know the boundaries under such agreements.

Communities use both natural and artificial boundary markers. Natural boundaries are generally rivers, mountain ridges and other natural contours (both depressed and protruding land surface). Natural markers are also often used, including stone, old trees (often trees that have beehives), and former gardens. These markers tend to be widely used, especially by indigenous peoples. Artificial (manmade) boundary markers include monuments, roads and fences. These manmade signs tend to be used by modern institutions.

Village and Indigenous Territory

The term "village" refers to what is commonly known in Java as *desa*, and to sociopolitical units known in other regions of Indonesia variously as *nagari, kampung, lembang, huta,* or*negeri*. This term is recognized by the 1945 Indonesian Constitution (before it was amended) and Law No. 32 of 2004 on Regional Government. This Law states that the territory of a village has territorial boundaries and the village has the authority to control and manage the interests of the people, based on the original, social and cultural rights of the particular community. Thus, village territory should refer to original rights before the establishment of the village.

In the four GP starter districts (Merangin, Muaro Jambi, Mamasa and Mamuju) where the District Readiness Assessment (DRA) study was conducted in preparing this report, the original rights associated with the socio-political unit were larger than the current village area. Generally, this unit is a federation of several kampung, each of which has now generally converted into a contemporary village. Kampung units no longer function today, especially with the establishment of *desa* (villages) during the New Order era[1]. But their boundaries are still recognized by the people as the most acceptable boundaries for all communities. In many cases, these old socio-political units can be referred to as indigenous territories (*wilayahadat*) – a term used by the member communities of the Indonesian Alliance of Indigenous Peoples (AMAN).

Conceptual Approach

This guideline enriches the methodology used in Regulation 27 by combining several aspects. First, the guideline follows the standard cartographic techniques (including the use of new spatial technologies such as GPS, GIS and satellite imagery) required under Regulation 27. Second, this guideline encourages meaningful participation by stakeholders – including women and other marginalized groups – so that the results accomplished incorporate the greatest amount of information and receive wide acceptance at the village level. This approach is expected to facilitate community participation in the development of a low-carbon economy and sustainable management of natural resources, while also reducing the potential for disputes. Third, this guideline adapts international best practices in participatory mapping that have long been applied throughout Indonesia by various NGOs. In addition, because the village is also part of a district and a province, MOHA Regulation No. 1 of 2006 on Guidelines for Demarcation of Regional Boundaries (as amended by MOHA Regulation No. 72 of 2012) also applies, affecting many aspects in the development of this guideline.

This guideline is designed to be easy to apply in the field, so that the village boundaries can be determined by the community, boundaries can be drawn on a map, and boundary markers can be placed in the field. This guideline also includes a recommended approach for adapting the general guidelines so that they can be legally recognized and enforceable in each district, as part of the village administration, land administration and spatial planning processes.

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[1]The common term for the period when President Soeharto ran Indonesia, from 1966 to 1998.

To enrich the methodology used in Regulation 27, this guideline also has social components, mainly at the village boundary delineation stage. Therefore, this guideline adopts large-scale participatory mapping as an input to Regulation 27. The participatory mapping component becomes the essence of the village boundary delineation process, while the activity stages set out in the Guideline on Village Boundary Delineation and Demarcation (published by MOHA as an Annex to Regulation 27) is the essence of the village boundary demarcation process.

The large-scale participatory mapping methodology, developed by the Center for the Support of Native Lands, was selected since it aims to map a large region (of up to 2,000,000 ha) containing 20-25 communities. This is in line with the target of setting all sub-district boundaries at once under a particular project. Using this approach should reduce time and costs, and mitigate the risk of disputes. The strength of this methodology is its emphasis on land use by the community. It is very useful for people in adjoining villages to understand among themselves the extent of lands under the control of each village, as this will help them negotiate the boundaries of the village. This issue is important because there is a strong tendency in rural communities to define land tenure as the boundaries of the village. The information will also be very useful in the rural spatial planning process (which follows the village boundaries), so there should longer be a need to map land use.

Stages of Village Boundary Setting

In this guideline, village boundary setting consists of two stages: delineation and demarcation.

Principles of Village Boundary Setting

In conducting village boundary setting, there are a number of social and technical principles that need to be taken into account, especially concerning ethics in mapping and technical requirements in mapmaking. The social principles are mainly derived from lessons learned in participatory mapping, while the technical principles are synthesized from policies on regional and territorial boundary setting.

1.1.1 Social Principles

Before conducting participatory village boundary setting, we first need to identify the various stakeholders, particularly the implementers of these activities. These social principles need to be understood and agreed upon by all parties in order to (i) minimize boundary disputes, (ii) accommodate rights of origin, and (iii) respect and protect the rights of indigenous peoples, marginalized groups and women. Principles that need to be followed in village boundary setting include, among others:

- The inhabitants of the village being delineated should have sufficient information about the plans, processes and steps to be performed, including project execution, who should be involved, and how they can get involved.

- All elements of society, including women and marginalized groups, should meaningfully participate in decision-making during village boundary setting.

- Communities should be guaranteed access to and control over the process and outcomes of participatory boundary setting.

- Communities should always be able to decide whether the participatory boundary setting activities can be carried out.

- Priority should be given to local people, especially inhabitants of the village being mapped, as the implementers of participatory boundary setting activities.

- Priority should be given to local knowledge about the boundaries, spatial utilization, and applicablecustomary dispute resolution mechanisms.

- A quality control mechanism should be put in place to maintain the quality of the boundary setting process and its products (including documents and maps).

- There must be recognition and protection of intellectual property rights over the resulting maps.

- Special attention should be paid to the origins of the community and territory for the area being delineated, whether contained in oral histories or in documents.

- Respect should be given for customary rules and social rules that still prevail in the area.

- Village administrative boundaries must not disregard the valid authority of customary institutions and/or customary rules.

- There should be a clear separation of authority between village government and customary institutions in administering the area.

- Village territorial boundaries should define the coverage area of government administration services, not limit ownership rights. So village territorial boundaries do not remove rights of ownership and rights to manage held by individuals and groups.

Technical Principles

- The map that is drafted should conform with the following specifications:

Type	Requirement
Horizontal data	(DGN 1995)

Ellipsoid reference	(WGS) 1984
Map scale	1:1,000 – 1:10,000
Map projection system	Transverse Mercator ™
Grid system	Universal Transverse Mercator (UTM) using Geographic Grid and metric
Planimetric accuracy	0.5 mm measured on map

- The format of the map should comply with SNI 19-6502.1-2000 on technical specifications of topographic maps on a scale of 1:10,000.

- As far as possible, the base map should be on a scale of 1:10,000. If that is not available, a working map of the same scale must be drafted.

- The boundary survey must be conducted geodetically with an accuracy of 5 cm or better.

Indicators of Participation

Since participation is a key component – if not the core – in participatory mapping, it is crucial to provide a set of indicators of participation. The indicators provided here are preliminary, as they may expand when the GP Program begins implementing participatory village boundary setting exercises on the ground.

Indicators of participation in village boundary setting:[2]

1) **Risk/enabling indicators** measure the influence of external factors:

a. policy environment to enable participatory village boundary setting; and

b. availability of funds from the government and other sources.

2) **Input indicators** measure the means by which the project is implemented:

a. comprehension among project staff on the technology, tools and research techniques under their responsibility; and

b. community comprehension on the technology, tools and research techniques used in the village boundary setting exercise.

3) **Process indicators** measure delivery activities of the resources devoted to a program or project; they monitor achievement during implementation in order to track progress towards the intended results:

a. protocols in conducting village boundary setting exercise, including free, prior informed consent from the community to carry out the exercise, and from individual villagers (particularly in individual interviews);

b. number of identification and planning meetings held with villagers;

c. participation of villagers based on gender (men, women), social status (elite, commoners, 'outcasts'), age (elderly, adult, young adult, children), and ethnicity in terms of numbers, roles in the activities, and quality of involvement of each category, and knowledge used and collected (including frequency of attendance by men and women, number of men and women in decision-making positions); and

d. quality of facilitation in accommodating the different interests and needs among different groups within a given community.

4) **Output indicators** measure the extent to which the project delivers the intended outputs and identify intermediate results, for example, when donor involvement is close to complete:

a. time required to gazette village boundaries; and

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[2]Adapted from Bastia, Tanja (2000).*Qualitative and Quantitative Indicators for the Monitoring and Evaluation of the ILO Gender Mainstreaming Strategy*.pp. 20-21; International Fund for Agricultural Development (IFAD) (2011).*Evaluating the impact of participatory mapping activities: Participatory monitoring and evaluation*(Rome:IFAD). p.7

b. the use of maps in daily life by gender, social status and age, and in securing community rights.

5) **Impact indicators** measure the extent to which the project has the intended effects, related directly to the long-term results of the project, and once donor involvement is complete:

a. Contributions of the process to social capital, e.g., Did the mapping process generate any motives for people to reassemble or undertake any collective action?

b. Change in natural resource management practices after participatory mapping.

Practical Notes

In planning the activities during village boundary setting, one needs to take into account the farming cycle of the villagers. If an activity is conducted during the planting and weeding times, one should expect only a few villagers are likely to participate. The best period for intensive activities is once the harvest season has ended. Furthermore, the day that most villagers will attend a meeting in daytime is on the praying day of the dominant religion in the area, i.e., on Fridays in areas with a Moslem majority, and on Sundays in areas with a Christian majority. On other days, meetings held in the evening are more likely to achieve high attendance.

As women and vulnerable groups tend to have a smaller chance of having their voices heard, one should proactively approach them. For instance, one can join a gathering with women in local stores, kitchens, and other places where women congregate in order to talk to them. However, local norms and customs should be respected.

1.1   Formation of Village Boundary Delineation and Demarcation Committee at District Level

Based on Regulation 27, the authority to establish a Village Boundary Delineation and Demarcation Committee resides with the District Head (*Bupati* or Mayor). The district government agency (*SatuanKerjaPerangkat Daerah*/SKPD) in charge of village boundary setting sends a proposal to the Bupati on the formation of the team, which becomes a consideration for the Bupati to issue the relevant decree. The team consists of representatives from:

a. Office of Assistant I on Governance Affairs at District Secretariat;

b. Office for Community Empowerment and Village Governance (*Badan Pemberdayaan Masyarakatdan Pemerintahan Desa*);

c. District Development Planning Agency (*Bappeda*);

d. District Office of the National Land Agency;

e. District Office for Property Tax Service at the Directorate General of Taxation;

f. Public Works Department;

g. Spatial Planning Department;

h. City Planning Department;

i. Office of the head of the sub-district in which village boundary setting is to be implemented;

j. Governments of the villages to be mapped; and

k. Other work units considered necessary.

The Bupati decree does not have to specify who will be the representatives from the sub-district office and village governments. The chair of the team is the head, or a subordinate in the office appointed to represent him/her, assigned to implement village boundary setting in the district concerned, i.e., from either the Office of Assistant I on Governance Affairs at the District Secretariat or the Office for Community Empowerment and Village Governance. The Village Boundary Delineation and Demarcation Committeeperforms seven tasks:

a. Planning and coordinating implementation of village boundary delineation and demarcation;

b. Performing technical/field supervision in village boundary demarcation;

c. Dissemination of village boundary delineation and demarcation;

d. Preparing a budget plan and seeking financing for the activity from the district/municipal budget, village budget, and other non-binding funding sources;

e. Compiling written regulations and any other legal sources related to village boundaries;

f. Assessing the written regulations and any other legal sources to delineate the provisional village boundaries on the map; and

g. Reporting all activities in village boundary delineation and demarcation to the Bupati, copied to the governor of the province.

Each district government agency and district office of a national agency is expected to perform a specific role (see Table 1).

Table 1.   Village boundary setting team roles

Government agency	Function	Implementer
Bupati	Provide general direction and be responsible for all activities in participatory village boundary setting	Assistant at District Secretariat, appointed by Bupati
Governance Division	Direct implementation to comply with policy on regional boundary delineation and demarcation, and coordination where a village boundary is also a sub-district, district or provincial boundary	Land/Agrarian Affairs and Regional Boundaries Sub-Division
Land Office	Direct and assist with village boundary setting activity to ensure it conforms with technical principles and government regulations	Survey, Measurement and Mapping Section
	Direct and assist with village boundary setting to mitigate the risk of land disputes and conflict	Dispute, Conflict and Cases Section
Office for Community Empowerment and Village Governance	Direct and assist with village spatial planning that falls under village authority, in accordance with existing government policies	Village Governance Division
District Development Planning Agency (Bappeda)	Direct and assist in data processing	
Forestry Department	Direct and assist with technical measurements related to forest areas	Forest Area Planning Unit
Sub-district Office	Liaison with and representative of entire district government team at sub-district level	Appointed by Sub-district Head

Preparations at District Government Level

The preparatory stages at the district government level are summarized in Table 3.

Table 2.   District government preparatory stages

No	Description of Stage	Institution in	Documents	Outcome

		Charge		
1.	Notification of proposed Village Boundary Delineation and Demarcation Team to concerned institution	District government agency (SKPD) in charge of village boundary setting	Cover letter and activities proposed	Letter of support and commitment from SKPD
2.	Submit proposed Team to Bupati	SKPD in charge of village boundary setting	Draft Decree on Village Boundary Delineation and Demarcation Team	Bupati Decree on Village Boundary Delineation and Demarcation Team
3.	Send Bupati Decree on Village Boundary Delineation and Demarcation Team to referenced government agencies	SKPD in charge of village boundary setting	Decree on appointment of Village Boundary Delineation and Demarcation Team	Assignment letter for SKPD representatives from their respective supervisors
4.	Planning meeting of Village Boundary Delineation and Demarcation Team	SKPD assigned responsibility for village boundary setting		- Explanation of responsibility - Identify proposal from sub-district for delineation - Budget development - Work plan
5	Joint meeting of Village Boundary Delineation and Demarcation Team and the Taskforce	Social and Technical Assistants at District Level		- Common understanding on methodology - Agreed-upon joint working mechanism - Detailed plan of activities

Preparations by Taskforce

The Taskforce should organize planning meetings to develop a detailed workplan. The GIS specialist/cartographer collects topographic maps (at a scale of 1:25,000 or 1:50,000 in digital format, if any), aerial photographs, satellite imagery, and so on.

The Taskforce should assess and determine the venue and lodgings for the workshops based on its own research and consultations with the Office of the Sub-district Head.

The community engagement specialist and mapping facilitators should collect available published information on the cultural and social issues in the subdistrict in order to sensitize themselves to the area.

Preparations at Village Level

The village boundary setting preparatory stages at the village community level are set out in Table 4.

Table 3.   Village level preparatory stages

No	Description of Stage	Institution in Charge	Documents/Equipment	Outcome
1.	Notification to village	Taskforce	- Computer	Notification letter to

	government regarding plan to have village boundary setting		- Printer	Heads of Village
2.	Visit villages to inform and seek consent for village boundary setting activities	Mapping Facilitators	- Assignment letter from Taskforce - Guideline on Participatory Village Boundary Setting - Assignment letter from Bupati Office - GPS navigation - Situation Map - Stationery	- Initial consent on village boundary setting - List of potential dispute areas in village boundaries - Plan for Village Meeting - List of coordinates of important sites in the village
3.	Village Meetings (Village Deliberation)	Village Boundary Delineation and Demarcation Team and Taskforce	- Stationery - Flipchart - LCD projector - Portable generator - Large durable paper	- Village consent on boundary setting - Village Implementing Team is formed - Community representative as member of Boundary Dispute Settlement Forum - Draft sketch map of village administration area
4.	Preparations at village level for first workshop	Village Implementing Team assisted by mapping facilitators	-	- Rough sketch map to be presented in workshop - Initial findings and writing on village boundary history

Objectives:

1.   Ensure that all villages in the sub-district are willing to map their villages.

2.   Ensure that the village representatives and village boundary setting personnel understand the methodology and stages of the activity.

3.   Formulate the basic principles of participatory village boundary setting and develop an activity plan that includes a timetable for each activity.

4.   Establish the boundary dispute settlement forum.

5.   Train the Village Implementing Team in sketch mapping and provide social information on the boundaries of their respective villages.

6.   Select or identify the information to be included in the map and the map symbols to be used.

The first workshop defines the overall mapping process. If this workshop runs well, gives clear orientation, and is thorough in terms of the mapping objectives, the methodology for drafting the map, and the overall scheme of mapping, then there will be less misunderstanding and confusion in the future. In short, a well-organized workshop with coherent comprehension of materials can help ensure the validity of the map. This activity has two parts: a Participatory Boundary Setting Workshop attended by all stakeholders in village boundary setting in the selected subdistrict, and Training for the Village Working Team, where the team members are taught to sketch maps and collect the necessary social information.

Participatory Boundary Setting Workshop

The participants expected to attend this workshop are:

-       Representatives of the Village Boundary Delineation and Demarcation Team (7 people)

-       Taskforce on Participatory Village Boundary Setting (8-10 people)

-       All Village Heads (or their representatives) in the selected sub-district

-       All Chairs of Village Consultative Body or other members representing the body in the sub-district

-       Village elders or *adat* leaders

-       Village Implementing Teams (5 people per village)

So if a sub-district consists of 10 villages, there will likely be 97-99 participants in this workshop, as follows:

-       Village Boundary Delineation and Demarcation Team, government elements (7 people)

-       Taskforce on Participatory Village Boundary Setting (8-10 people)

-       Representatives from villages: 8 people per village

-       Sub-district office: 2 people

This workshop is organized, prepared and facilitated by the Taskforce. This workshop should ideally be held in the sub-district capital of the region to be mapped.

Workshop agenda:

Day 1: Presentation on activity stages, presentation by each village on information relating to their village, jointly identifying potential disputes on village boundaries.

Day 2: Develop workplan, including deliberation on village boundary disputes, formation of boundary dispute settlement forum, agreeing on the mechanism for boundary dispute settlement.

Training for Village Participation Team

This training is attended by all Village Participation Team members. It aims to improve their knowledge and skills in facilitating participatory village boundary setting. Training participants are expected to be able to:

a) explore and document community land use in the village where they live;

b) explore and document evidence of territorial claims – both oral histories and written documents;

c) facilitate sketch mapping of the village's territory; and

d) facilitate collection of spatial data on territorial boundaries using hand-held navigational GPS units.

e) facilitate communication and coordination within the team to ensure that all team members are well informed and work together as part of the sub-district team.

The training should employ adult learning methods, or implement Experiential Learning Theory (ELT) and the participatory method as far as possible, strengthening them through practice rather than theory. Training materials are divided into two categories: social and technical. General details of the training topics follow.

Community researchers:

- Identifying community members who have knowledge of and understand village territorial boundaries

- Techniques for exploring and documenting territorial evidence

- Techniques for collecting place names for village boundaries

- Techniques for building consensus on territorial boundaries with adjacent villages

Community mappers:

- Drafting sketch map of land use

- Recording geographical coordinates and describing boundary environment

- Operating GPS navigation

- Drafting map following field survey

Training should be conducted in one of the villages where the mapping will be conducted, with the expectation that participants can learn about real conditions in the field. However, in determining the village to be the site of training, supporting conditions should be considered, including the availability of a training venue, availability of electricity, and the condition of the local community. Accordingly, the mapping facilitators should first identify a proposed training venue and then discuss it with the sub-district and village governments.

The training is facilitated by the team leader supported by the mapping facilitators and community engagement specialist. The Taskforce will first prepare all matters relating to the substance of the training, while the sub-district assistant handles the technical aspects.

Training materials:

1. *Introduction to maps* (what is a map, how to make it, what it does)

The Task Force shares basic knowledge of maps and mapping. To that end, the Taskforce needs to bring along various types of maps to help introduce the topic, including maps of the country, the world (and a globe, if available), a number of thematic maps (these can be found in an atlas, and may show things such as population distribution, rain intensity, agricultural land, forest coverage, and conservation areas), and old maps. They should also bring any government-prepared base maps of any scale that include the area to be mapped. These maps will help to demonstrate the various aspects of cartography, the practical use of maps, and the weaknesses in traditional map-making in the region.

One important item to be discussed is map scales. The concept of scale is quite difficult for some people to grasp, so there needs to be a clear explanation of this concept, which is closely associated with the mapmaking sketches to be performed later. (Based on past experience, community representatives tend to focus on describing the signs around settlements. In fact, such spatial information may not be clearly visible if the maps used are at a scale of 1:50,000.)

2. *Drafting a sketch map*

Sketch maps are an important part of the participatory mapping process, since people describe how they use space by categories, using names that are used in everyday life. These maps will be the basis for negotiations with other villages and can be used in participatory village planning (including the spatial plan). At least three steps need to be covered by the training.

a.   Information on the map

The objective of this step is to decide what will be included in the map. There are three types of general information that need to be depicted:

- Physical features that stand out, both natural (rivers, small streams, creeks, swamps, hills, mountains) and man-made (villages, roads, footpaths, bridges).

- Subsistence areas, including agriculture, hunting, fishing, fruits, medicinal plants, firewood, building materials, timber to sell.

- Areas of cultural, spiritual or historical importance, such as shrines, caves, ruins, abandoned villages, cemeteries.

In the discussion group, the elements to be included in the map should be listed at the top of the board or sheet of paper. Areas that are important to women and marginalized groups also need to be included. The list should be made by the Village Implementing Team, not by an outsider such as a cartographer or people who are not from the villages being mapped. Start with natural and artificial physical objects, listing them one by one. Then do the same thing for local subsistence, and for culturally, spiritually or historically important areas. Many people will participate in making this list, and there is a tendency to make the list very long. Since too many categories will fill the map and make it difficult to understand, the initial list must then be shortened to produce a final list that is manageable.

Make sure that the various categories are not too specific. There is not enough space on the map to include all types of animals and plants, or the sizes of all hills. Hunted animals can be combined into a single category ("hunting area") unless there are one or two very important types (in which case, there may be a general category for hunting and a category specific to the important animal). The same principle applies to fishing, gathering and farming activities.

b.   Choose map symbols

After deciding what to include in the map, the next task is to select the symbols to be used to describe the objects. In participatory mapping, villagers have the freedom to decide together which symbols they will use. This can take the form of a competition and discussion.

Many symbols are similar across cultures, although detailed pictures may differ. For example, fishing areas are always depicted by a type of fish. However, symbols may vary for certain other categories. Hunting areas could use the most popular hunted animals in the area, or a bow and arrow symbol. Agricultural areas may be described by the plants or the entire farming plot. Cemeteries and sacred places can use a variety of shapes and images, depending on the local culture. Gardens may be described as a polygon with a plant in it or a collection of trees. Ultimately, each group chooses what objects to include in the map, and how to describe them.

c.   Exercise to make sketch map

After selecting the objects and symbols to include on the map, the participants need to practice making a sketch map. At least a full day should be allocated to this activity. It should be done in small groups using paper and pencils to draw the selected area with a scale of 1:10,000, starting with the basic map provided by the cartographic team of the Taskforce. Where a base map on a scale of 1:10,000 is not available, a working map should be prepared using high-resolution satellite imagery or aerial mapping with appropriate technology, such as an unmanned aircraft using remote control. This map should be made before the training is conducted.

Before participants begin to make their map, the cartographic team can help by describing the major rivers and other vital signs, to provide a framework of reference. The Village Working Team members begin by gathering information mentally and translating it onto the map. This transfer of information from head to paper will get faster, and they will realize that they can actually draw a map. This increases their confidence. While the first map is only a framework, they will appreciate where the process is going.

3.   Using GPS navigation

GPS navigation is used in boundary surveys, so the working team members need to know how to use it. At this stage, participants get basic knowledge of GPS navigation, and practice how to use it. Practical details for this session will depend on the type and model of GPS equipment being used.

After the training, the team will work and be equipped with the necessary equipment to collect data and create a sketch map. The equipment provided will include, among other things, durable paper (e.g. tracing paper), a plastic tube for storing the map, sheets of paper, colored pencils, pens, and notepads.

Objectives:

1.   Draw sketch map of land use and village boundaries.

2.   Collect information and documents on village boundaries.

3.   Draw indicative boundaries of any indigenous territory within the area.

Once the Community Implementing Team have been trained, they will then return to their village with a work map prepared by the cartographic team. This is the map processed from the topographic map (base map) and other sources. The minimum scale of the work map is 1:10,000. This work map will contain basic information on prominent natural landmarks such as rivers, elevation points, roads, settlements, and other information that will facilitate the people in making sketches of the territorial boundaries and land use.

The field activity stages are set out in Table 5.

Table 4.   Field activity stages

No	Description of Stage	Person in Charge	Inputs	Equipment	Outputs	Time
1	Putting together outcomes of workshop and participatory training	Leader of Village Participation Team	- rough draft sketch map of village boundaries from workshop - Notes and materials from workshop		Presentation material for village meeting	1 week
2a	Production of sketch map on village territorial boundaries and land use based on discussions with knowledgeable persons (primarily elders, hunters), women and vulnerable groups	Community mappers		- Large durable paper - Colored pencils - Rulers - Pens - Plastic map tubes	Draft sketch map of village boundaries and land use	1 week
2b	In-depth interviews with elders and other knowledgeable persons on history of *kampung*/village and *adat* territory (if any), boundary agreements, as well as with holders of written evidence or documents regarding boundaries	Community researchers		- Notebooks - Pens - Large paper sheets	- Village history - Written evidence of boundary agreements or claims - List of place names along boundaries of village and *adat* territory	

No.	Activity	Who	Materials/Documents	Equipment	Output	Duration
3	Meetings of adjoining villages	Village Head, Village Participation Team mapping facilitator	- List of place names along boundaries from each village - Written evidence of boundary agreements or claims	- Flipchart - Notebooks	- Agreement on boundaries of adjoining villages (Form 1, Appendix 3)	1 week
4	Making sketch map of indicative indigenous territory (if any) by interviewing elders and indigenous leaders	Community mappers, mapping facilitator	-	- Large durable paper	- Sketch map of indigenous territory - List of place names along indigenous boundaries	1 week
5	Village deliberation to present draft sketch map of land use and village boundaries, village history, and evidence of claims	Village Head and Village Participation Team, assisted by mapping facilitators	- Draft sketch map resulting from workshop - Notes and materials from first workshop	- Stationery - Flipchart - LCD projector - Portable generator - Large durable paper	- Community perception of workshop results - Formulation of village territorial boundaries (list of place names and boundaries), collection of village boundary evidence - Revised sketch map of village jurisdiction	1 day
6.	Data processing	Village Head and Village Participation Team, assisted by mapping facilitator		- Access to photo-copier and binder	- Binder of documents concerning village boundaries - Final sketch map of village territorial boundaries and land use	7 days

Collecting information to make a sketch map presents several issues, notably the appropriate format for the meeting and the number of people to be interviewed. The best method is to hold in-depth interviews with four or five people (generally elders and hunters) in the village who have extensive knowledge of the village's territorial claims, place names for its boundaries, and the village history.

To do this, the Village Implementing Team can select resource persons after consulting the Village Head and key leaders of the community. To ensure its validity, they are then invited to discuss the information collected in a focus group discussion.

The selection of resource persons tends to result in a list consisting entirely of men, as spatial knowledge about the territory is usually passed down to young adult males. A separate session should therefore be arranged to document the knowledge held by women and vulnerable groups. The female community researcher is responsible for facilitating this session.

Information from all sources is then collated and put on the sketch map. To ensure that the information collected and the sketch maps are sufficient and of good quality, the mapping facilitators and community engagement specialist should visit each village to monitor the work of the Village Implementing Team. The sketch maps and information on territorial boundaries are then presented at a village meeting attended by as many people as possible, including women and vulnerable groups, to obtain feedback and input for improvements. If the village is large, a meeting can be held in each *kampung* or hamlet. The meeting should be facilitated by a mapping facilitator assisted by the Village Implementing Team, and should include a note-taker to ensure record keeping for future reference.

7.   Production of Draft Village Boundary Maps Cartometrically

Objective:

-        Draft village boundary cartographic map on a scale of 1:10,000 for selected sub-district

The main activity in this stage is transferring the information from the sketch maps on land use and village boundaries and the village boundary formulation into a cartographic or scaled working map. Village boundaries are delineated on the map, which is also known as drawing the boundary lines cartometrically. This working map should have a scale of 1:10,000 and is the result of processing topographic maps and high-resolution satellite imagery. The transfer can be done on the map sheet by referring to the satellite imagery to determine the coordinates of the village boundaries and any indigenous territory. The Cartographic Team of the Taskforce then processes this information into digital form using GIS.

For this stage, the Cartographic Team and the mapping facilitator assigned to the villages concerned visit villages that have already completed their sketch maps. Prior to these visits, the Cartographic Team prepares working maps with a scale of 1:10,000 based on the available topographic maps or, where these maps are not available, the geo-referenced maps they develop using appropriate mapping technologies (including unmanned aerial vehicle/UAV). The map is then processed within GIS against georectified, high-resolution satellite imagery for the area concerned. If satellite imagery is unavailable, the Team can produce shaded relief maps to enable villagers to understand the maps.

The transfer of boundary and land use information takes two forms. For general spatial information, the Cartographic Team projects the map from a laptop computer onto a makeshift screen using an LCD projector to allow villagers to delineate on screen the agreed village boundaries and large polygons for land use categories, which the Team directly digitizes into its GIS. For land use categories with small coverage, the sketch maps are used. Women, youths and vulnerable groups in the village should be encouraged to locate areas important to them. The advantage of this method is that it can involve more people while processing the spatial information quickly.

Once this process is complete, the Cartographic Team will print a draft scaled map of the village and hand it to the Village Implementing Team, which then presents it to fellow villagers to be verified. If there is any correction, the Team will make necessary revisions and print a new map to be presented at the Workshop on Village Boundary Delineation.

The Cartographic Team next combine all village boundary maps into a map of the sub-district as a whole, noting any overlapping village boundaries. Where there are indigenous communities in the sub-district, an indication of indigenous territories is also included, based on information collected from each Village Implementing Team. The Cartographic Team will present the compiled map at the Workshop on Village Boundary Delineation to show the sub-district as a whole, as the basis for boundary negotiations between villages.

Objective:

- Each village presents its version of the village boundaries and supporting documents.

- Overlapping boundaries are identified.

- Consensus is reached on the common boundaries of the villages in the sub-district being mapped.

- Consensus is reached on boundary dispute settlement.

- A follow-up work plan is developed for the village boundary setting activity.

At this stage, the draft map of village boundaries and supporting documents will have been prepared for presentation by each village. The Cartographic Team will have completed the necessary maps using GIS. Participants expected to attend this second workshop include:

- Village Boundary Delineation and Demarcation Team (7 people)

- Taskforce on Participatory Village Boundary Setting (8-10 people)

- All Village Heads (or their representatives) in the selected sub-district

- All Chairs of Village Consultative Body or other members representing the body in the sub-district

- Village elders or *adat* leaders

- Village Implementing Teams from each village (5 people)

- Candidate members of the boundary dispute settlement forum, by village

- District and sub-district support teams

If the sub-district has 10 villages, there will be around 80 workshop participants:

- Six participants from each village: 60 people

- Taskforce on Participatory Village Boundary Setting: 8-10 people

- Village Boundary Delineation and Demarcation Team: 7 people

- Sub-district representatives: 2 people

This workshop is organized, prepared and facilitated by the Taskforce. It should take place in the sub-district capital.

Workshop agenda:

Component 1: Presentations of Proposed Village Boundaries

(1) Presentation from each village on village boundaries and evidence of claims

(2) Presentation of compilation map for entire sub-district by Cartographic Team, including presentation of any indigenous territory and overlapping village boundaries,

(3) Identification of boundary segments that are settled or require further negotiation.

Each activity is followed by a discussion. The Cartographic Team will present an overall draft of the village boundaries to reach a basic understanding on which boundaries can be finalized, and which are still overlapping.

Component 2: Follow-up Agreements

(1) As the negotiation of village boundaries will have taken place during the Field Period, villages where the boundaries are agreed or where evidence of claims is accepted by adjoining villages can proceed to reach a consensus on the planning of boundary surveys and on where the interim boundary markers will be placed. After completing this process, they fill out Form 2 (see Appendix 4).

(2) Villages that still have boundary disputes can plan the settlement process by setting a date for negotiations. When necessary, neighboring villages can find a mutually acceptable mediator to assist with the consensus building process.

Village Boundary Surveys

Objective:

- Give people from each village an opportunity to know the results of the Workshop on Village Boundary Delineation.

- Survey the agreed boundaries on the ground, and install interim boundary markers.

- Where the boundaries have been agreed on the ground, produce a map of village boundaries based on the survey.

- Deliver the village map to the community concerned for gazetting.

The village heads report to their villages on the workshop outcome (i.e. either that the village boundaries have been agreed or require further negotiation).

Once everyone in the village accepts the outcome of the second workshop, a boundary survey is conducted. This activity is led by the surveyor, assisted by the mapping facilitators. If the boundary survey includes sub-district and district boundaries, representative of the Regional Boundary Demarcation Team should be present at or be advised on the survey. The field data will also be submitted to the Regional Boundary Demarcation Team.

This survey involves the surveyor, mapping facilitators, community mappers, representatives from the Village Boundary Delineation and Demarcation Team, sub-district office, and governments of adjoining villages, and inhabitants of adjoining villageswho have good knowledge of the boundaries or the area being surveyed. The coordinates taken in this survey are site locations agreed with the adjoining villages (as listed in Form 2). The community mappers should be allowed to take coordinates using hand-held GPS units and write the numbers down in Form 3 (see Appendix 5). The more coordinate readings that can be taken, the more accurate the map will be, so readings should be taken every 100 meters if possible. Every 500 meters along the boundary surveying route, the surveyors should install an interim marker that is either pre-painted or painted on location, in line with the color agreed by the adjoining villages. (Red is the most commonly used color.)

During the surveys, boundary disputes often arise primarily due to landowners objecting to where the boundary markers are being installed. As far as possible, such disputes should be settled on site with advice from the indigenous leaders or government officials participating in the survey. If consensus cannot be achieved, then the matter should be brought to a negotiation between the leaders of the adjoining villages, taking into consideration the needs and interests of the landowners in the disputed locations.

Once the adjoining villages have reached agreement on the locations of the boundary markers, the Cartographic Team drafts a new map showing the boundaries and the locations of the interim boundary markers. The new draft maps are sent to the villages for final verification on the locations of places and land use categories as well as on the correctness of names and spellings. Once the map is approved, the Cartographic Team will print a final version of each village map that complies with Regulation 27.

After the final maps are produced, the Taskforce arranges delivery of the village maps to the respective villages in a ceremony attended by the village government officials and villagers. The presence of the Sub-district Head and a district government official (preferably a representative from the Village Boundary Delineation and Demarcation Team) will boost the pride of the community. At this event, the Team Leader of the Taskforce presents the map together with a letter of handover (*beritaacarapenyerahan*) signed by the Team Leader, Village Head and other village dignitaries, with the Sub-district Head and district official as witnesses.

Objectives:

- Install permanent village boundaries to replace the temporary boundary markers.
- Produce village boundary maps that can be submitted for a Bupati decree to be issued, and that meets the standards set out in Regulation 27.

7.1   Construction of Permanent Boundary Pillars

When all temporary boundary markers have been installed, the Village Boundary Delineation and Demarcation Team can install permanent boundary pillars following the specifications set out in the Appendix to Regulation 27. Boundary pillars should ideally be installed at sites that tend to be disputed. For a village that also has district or provincial boundaries, this activity should be coordinated with the neighboring regional administrative units, as the costs can then be shared with the regional budget (APBD) of the neighboring district or province, and the state budget (APBN).

Construction and installation of village boundary pillars aims to achieve clarity by asserting the boundaries between villages in line with the consensus reached. There are three types of village boundary pillars:

- Main Boundary Pillar (*Pilar Batas Utama*/PBU) is a boundary pillar installed at certain points, particularly at the start and end points of the boundary, and at certain distances along the boundary.

- Intermediate Boundary Pillar (*Pilar Batas Antara*/PBA) is a boundary pillar installed between PBUs in order to increase clarity on the boundaries between two villages, and at certain other points where considered necessary.

- Boundary Control Pillar (*PilarKontrol Batas*/PKB) is a pillar installed nearby village boundaries to indicate that these boundaries exist. A PKB is installed when a pillar cannot be installed on the actual boundary for various reasons (e.g., a river or highway, or where the land is unstable).

The standardized intervals for the construction of PBU, PKB and PBA are as follows:

- For village boundaries with high potentials (population density, economic value, cultural value, etc.), the frequency of each pillar should be at least every 0.5 km to 1 km.

- For village boundary pillars where potentials are lower, the pillars can be installed between 1 km and 3 km apart.

Pillar construction should follow these criteria:

- Be installed on stable land, protected from erosion and abrasion.
- Be easy to find and easy to reach.
- Be safe from intrusion by human or animal activities.
- Provide an uninterrupted view of the sky (for GPS readings on boundary pillars).

The requirements for pillar installation are as follows:

- For village separator signs, a type D pillar that is 20 cm long, 20 cm wide and 25 cm high, with a depth of 75 cm into the ground.
- If deemed necessary, a PBA can be installed between two PBU, depending on conditions in the field. PBA for village boundaries can be 20 cm long, 20 cm wide and 20 cm high, with a depth of 40 cm into the ground.
- A brass tablet should be installed on top of each pillar to identify it. In addition, a plaque should be installed on one wall of a pillar facing north to describe a boundary pillar between two or more villages. The names of the bordering villages should be written on the plaque.
- The results of the boundary pillar installation can then be documented in minutes of meeting for the village boundary pillar installation (see Form 32), which is signed by the Village Heads of the bordering villages and acknowledged by the Team Leader.

Natural boundaries and man-made boundaries are used to determine village boundaries. If the legal basis for village boundary demarcation is unclear or does not exist, the principles described below can be applied to determine the points for pillar installations.

7.2 Using Natural Boundary Markers

River

The boundary line on a river is an imaginary line located in the middle of the river, dividing the river into two equal widths (see Figure 4).

Figure 1. River boundary markers

Notes:
- ■   Village boundary
- ■   Boundary pillar
- □   PKB(Boundary Control Pillar)
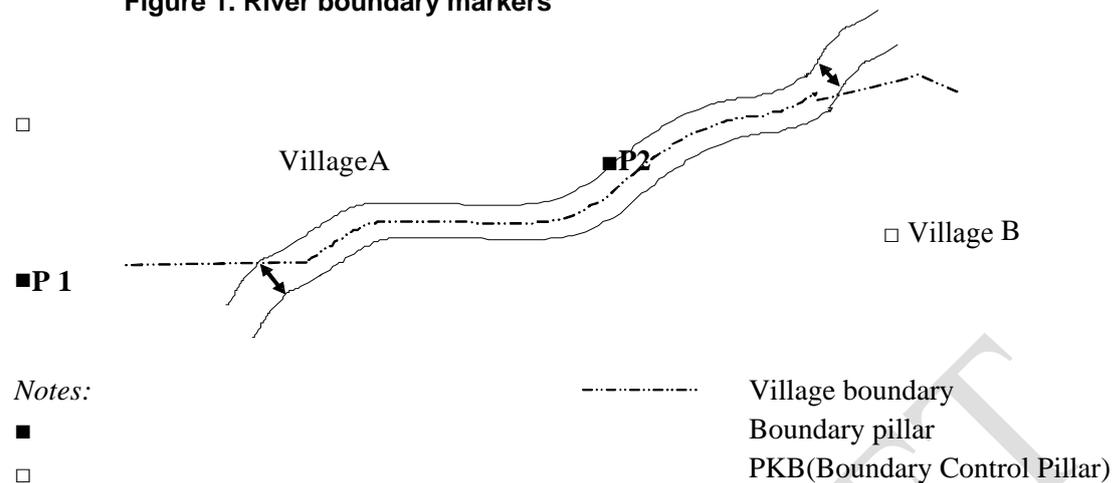
The intersects between the boundary and the river per Figure 4 (i.e. P1 and P2) are installed using a pillar to clarify the beginning/end of where the boundary intersects with the river. Pillar installation should be on stable ground. Boundary pillars cannot be installed exactly at the intersection of the center of the river with the edge of the river, since the soil there is generally unstable. The distance from the P1 pillar to the closest and farthest river edges, and its direction, are all measured. The same applies to the P2 pillar.

In unstable soil conditions, the pillar is installed far enough from the river's edge for the pillar to be a boundary control pillar (PKB) rather than a boundary pillar.

In the example in Figure 4, a situational drawing is needed, including measurements to determine the boundary along the river when drafting map boundaries, on a scale of 1:1,000.

Watershed

Generally, a boundary connecting two mountains will apply the watershed principle (see Figure 5).

Figure 2. Watershed boundary markers
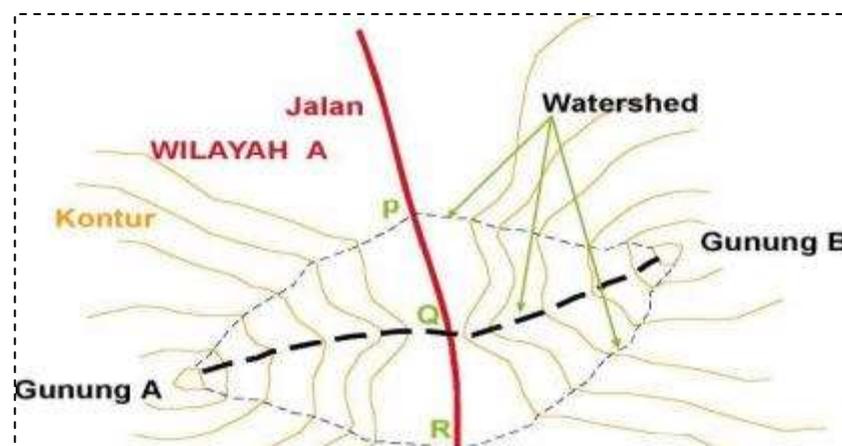
The boundary in the watershed is an imaginary line that starts from the first mountain peak (Gunung A) and follows the ridges that lead to the next mountain peak (Gunung B). Figure 5 clearly shows that the shortest water separation line is a dotted line that connects Gunung A to Q to Gunung B. The disconnected watershed is connected by a straight line or other agreed line.

There are two criteria for determining the boundaries of a watershed:

- The line should not intersect a river.
- If there is more than one water separating line, then the boundary shall be the shortest water separating line.

Lake

A lake can be differentiated into two areas: a land area and a water area.

1) Land Area

What is considered the land area is the limit of the lowest low tide.

2) Water Area

Division of water area can be as follows:

a) Whole lake belongs to one village,with the edge of the lake being the boundary, or

b) Lake is the boundary between two villages.

Figure 3. Lake boundary markers

■ P2

Village A

Boundary

Lake

24
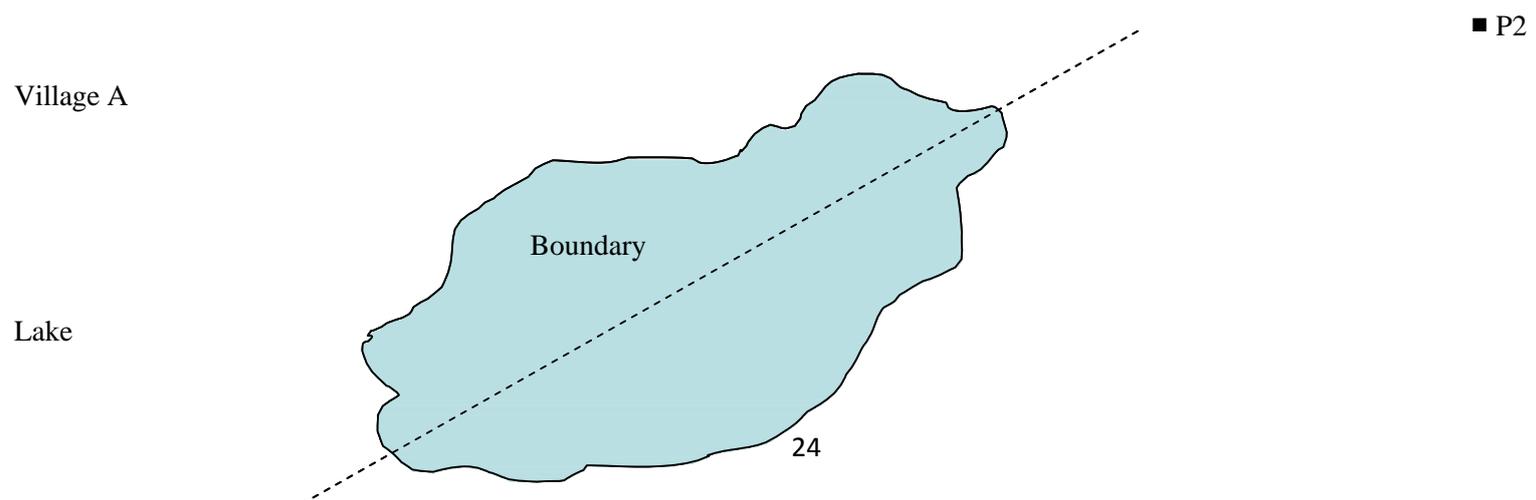
P1

■

Village B

P1, P2=Boundary Pillars

The boundary is a straight line connecting P1 and P2. P1 and P2 are boundary pillars installed at the boundary's intersection with the banks of the lake or, where more than two villages border the lake, either the boundary delineation under the local bylaw applies, or else it is based a consensus among the bordering villages.
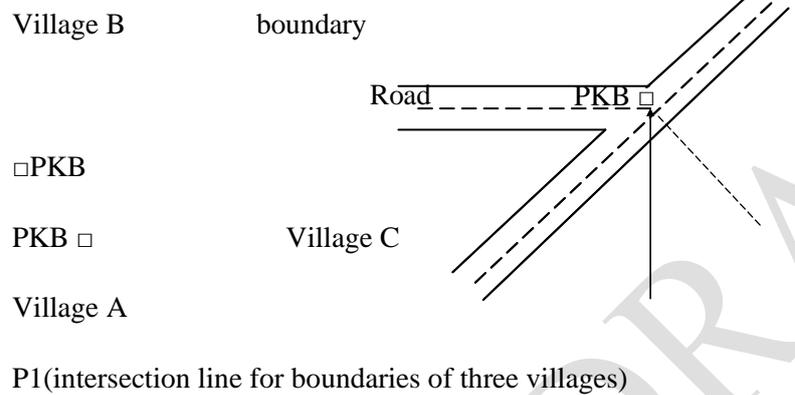
Using Man-made Boundary Markers

Generally, man-made elements used as village boundaries include roads, railways, and irrigation channels. For boundaries in the form of roads, railways, irrigation channels, and canals, the axle or edge can use territorial boundary marks between neighboring villages, based on a consensus between the two villages.
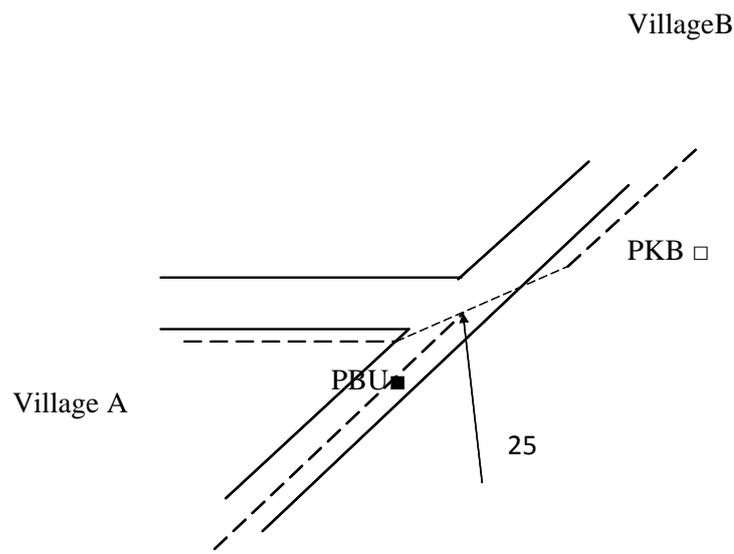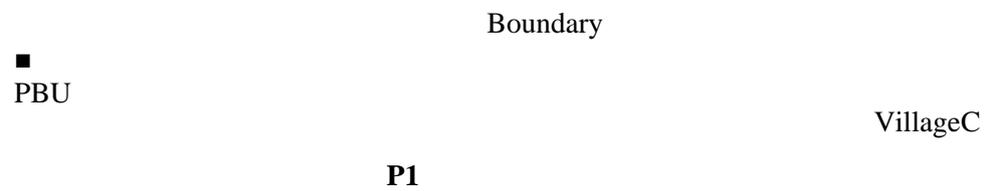
Road

Road axle

Figure 4. Road boundary markers

Village B   boundary

Road _ _ _ _ _ _ PKB □

□PKB

PKB □   Village C

Village A

P1(intersection line for boundaries of three villages)

For roads used as boundaries as per Figure 7, the boundary is at the intersection of the axle with the road. To know the axle of the road, several control points need to be installed, either on street corners or at road intersections, to determine the position of the boundary (road axle), and the measurements required on both sides of the road to determine the road's width.

Road fork

VillageB

PKB □

PBU■

Village A

25

Boundary

■
PBU

VillageC

P1

Figure 5. Road fork boundary markers

Specifically for boundaries located around a fork in the road (e.g. Figure 8), it is necessary to use boundary control points and boundary pillars to determine the boundary position at the fork in the road. The control points are placed at the edge/side of the road. Placement of the pillars must consider the possibility of road widening. Furthermore, measurements of distance and angle of the three pillars (PBU and PKB) lead to the point of intersection of the boundary between Village A, Village B and Village C being point P1.
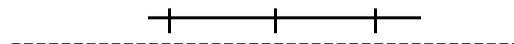
In Figures 7 and 8, a situation map on a scale of 1:1,000 would be ideal.

Railway

Railways apply the same principles as roads for the installation and delineation of boundary signs (see Figure 9).

Figure 6. Railway as village boundary

Village A □PKB

Village boundary line

Village B   □PKB

Irrigation channel

Irrigation channels as village boundaries apply the same principles as roads (see Figure 10).

Figure 7.Irrigation channel as village boundary

Village A

□PKB

Village boundary

□PKB

Village B

7.3   Boundary Surveys

A boundary survey is conducted in accordance with the directives under Regulation 27, using differential GPS to improve the accuracy of survey points down to one centimeter. There are two options for this stage. The first option is to use the geodetic GPS network built by BPN and or BIG in CORS (Continuously Operating Reference Station) network. This technology uses the mobile phone network developed by the National Geodetic Survey (a US government agency), and can reduce the cost of infrastructure development. However, because not all villages in the starter districts have access to mobile phone networks, this technology can only be used in certain areas.

The second option is to build a differential GPS network using a GPS base in the district capital. The investment required for this method is quite high, since a GPS base costs up to IDR 250 million.

7.3.1   Measuring Boundaries

- Boundary measurements are made when needed.

- A boundary measurement is a detailed situation measurement along the boundaries of a certain corridor.

- A detailed measurement is done using polygon and tachometric methods.

- The data in the form of a description of the boundary pillars and dots at the boundaries are documented along with the measurement book and the minutes of meeting on village boundary consensus signed by the parties.

7.3.2 Determining Position of Village Boundary Pillars

- The position of the pillars should be measured immediately.

- Precision standards for village boundary pillar coordinates (standard deviation) are:

- For PBU andPKBU±5cm

- For PBA and PKBA ±5 cm

To achieve this level of accuracy, measurements should use the GPS method and geodetic GPS equipment. If that is not possible, measurements should be tied to at least one control point on the national horizontal. This means that the resulting coordinates will be in the national reference system, which currently uses the National Geodetic Datum 1995 (DGN 95).

Drafting Boundary Maps

Based on the coordinates obtained from the boundary survey, a draft village boundary map can be produced. Wherever possible, this map should be prepared on a scale of 1:10,000 to show detailed spatial information on the village. The map drafted must meet the SNI 19-6502.1-2000 standards on technical specifications for topographic maps on a scale of 1:10,000. Based on these standards, the resulting map covers an area of 2'30" x 2'30" or, if near the equator, approximately 4.6 x 4.6 km. The draft map should be sent to each village to be verified by the village community. Any adjustments should be made immediately before the final map is printed.

The map should present appropriate information in line with needs. Each map must meet the specifications in line with the theme of the information being presented (see Table 6).

Table 5.   Types of information presented on map

Aspect	Description
Cartographic	a) Type of map (presentation): photo map, line map b) Symbol system/legend and color c) Map content and theme d) Size of map e) Presentation format: hard copy or digital
Geometric	a) Scale/resolution b) Map projection system used c) Planimetric accuracy (x, y) and height above sea level
Method of Village Boundary Mapping	a) Taken from existing map, or b) Mapping terrestrially, or c) Mapping using another method (photogrammetric, etc.)

The three types of territorial boundary map based on the drafting procedure are set out in Table 7.

Table 6. **Types of boundary map**

No.	Type	Notes
1	Map resulting from boundary delineation	This is a territorial boundary map created cartometrically from existing base maps, without field measurements. This is usually made at the time of a village's expansion.
2	Map resulting from boundary demarcation	This is a territorial boundary map created using the existing base map, coupled with data obtained from field measurements.
3	Map resulting from verification	This is a territorial boundary map that have been created by the village and whose results have been verified (through research and adjustments) by the District/City Boundary Delineation and Demarcation, before being signed by the Bupati/Mayor.

7.4   Process of Village Map Drafting

The village boundary mapping process can be done in various ways, including by drafting a situation drawing or processing an existing (digital) map. If derived from an existing map:

- The village boundary map can be obtained from existing maps such as base maps, land title maps and block maps, or based on aerial photographs, satellite imagery, and other data sources.

- The process can be done manually or digitally (cartographically), with any necessary scale adjustment to match the equipment or appropriate method.

- Depicted in detail are elements relating to the village boundaries, such as boundary pillar location, road network, water, and other details needed by the village.

- In the digital method, a base map is digitized and selected through a computer screen to be re-described by the printing equipment (plotter or printer).

Drafting the Situation Map

Measurements for drafting the situation map can be applied terrestrially. The recommended map scale is 1:1,000. Measurements required are:

- Measurement of horizontal control framework using polygon method, with specifications per Table 3.

- Situation measurement using tachometric method, in which detailed objects are taken in accordance with the technical mapping scale.

- Scale of between 1:1,000 and 1:10,000.

The entire set of definitive coordinates for the boundaries – whether PBU, PBA or PKB – should be included in the village boundary map.

Gazettingof Village Boundaries

Objective:

- Prepare minutes of meeting on consensus on village boundaries.

- Submit approval letter on boundary demarcation from each village.

At this stage, the village government prepares a written request to the Bupati through the Head of Sub-district. The letter should be accompanied by the minutes of agreement and the village map. The Sub-district Office will file requests from all villages (once all village boundaries have been settled) to the Village Boundary Delineation and Demarcation Team, which will then process the request letters. The Team as a whole or the Governance Division will then draft a Bupati decree (or decrees) on village boundaries. The decree(s) will then be announced in the District Gazette.

Settlement of Village Boundary Disputes

Village boundary disputes are common, so it is necessary to have a recognized and well functioning institution to settle such disputes. The institution here is the norm (legal basis used, either formal written law or customary law, which tends to be oral law), the actors involved agree to use the dispute settlement mechanism for village boundary issues, and an operational mechanism exists for settlement (accept objection, coordination with parties, material and data inventory and identification, field visit, mediation, drafting recommendation, reporting and evaluation).

In general, the customary dispute resolution institutions in society still exist and function. Where that does not occur or lacks some steps, the mechanism needs to be revitalized by accommodating the current context. Clarity on the proposed mechanism is significant to ensure that all parties to a dispute will accept the result or decision made. If a dispute cannot be properly resolved among disputing villages, it will be brought to the PPBK or PPBAK. As far as possible, disputes should be resolved by consensus between the disputing parties. The boundary dispute settlement adopted by MOHA under Regulation 27 and MOHA Regulation 76 of 2012 provides that if a dispute cannot be resolved by the two parties concerned, then higher level officials will make the final decision. When that occurs, the dispute is likely to continue. One example is the boundary dispute between Mamasa District and surrounding districts in West Sulawesi, which has continued despite the existence of MOHA Regulation 15 of 2005, which set the district boundaries. A clear contingency dispute mechanism should be in place to minimize future risks. This acts as a safety net for structural implementation challenges in the field. To resolve the dispute, the disputing parties can be reconciled by the mapping facilitator and or community engagement specialist and sub-district government representatives, who will embark on the deliberation process and approach both parties to achieve resolution of the disputed boundary. The mapping facilitator and or community engagement specialistwill try to seek consensus between the two parties. If a resolution is found, the process will move on to boundary setting. But if no common ground is found, the disputing parties will once again be requested to discuss the matter and find a mutually agreeable solution to resolve their differences. If disagreement persists between the parties, they are encouraged to take these issues to the PPBK or PPBAK.

Periodic evaluation

Dispute settlement institutions and mechanisms are not fixed. A forum or mechanism is needed that can offer creative solutions acceptable to the parties in dispute. These dispute settlement mechanisms will continue to be evaluated periodically for lessons learned and to seek ways to improve the process. Such evaluations will be scheduled at least once every three months, beginning within six months after the team is formed. Evaluation is conducted at sub-district meetings attended by representatives from the district, sub-district, village government, village institutions, *adat* institutions, and community leaders (including representatives of women's groups and youths). Sub-district and district assistants will assist with the work of the PPBK and PPBAK teams by documenting processes that have been carried out. The settlement process and stages should be accessible to the disputing parties and other parties.