

# Forest boundary surveying in Nepal's community forestry

K. P. Acharya<sup>1</sup>

In Nepal forest boundary surveying must be done before handing over a forest to community. The present paper, upon analysing 160 community forestry Operational Plans (OPs) in the three hill districts of the country, revealed that there exist a practice of making a forest map to be included in every OP. And, the use of chain and compass is the most commonly practised surveying technique. Such maps are prepared generally by joining the straight lines with little or no references. A significant variation in their properties such as survey methods, choice of a scale and forest blocking exists. Consequently maps thus prepared are less useful and informative. On the other hand, preparation of a huge number of CF maps for the on going forest hand over process, and also for up-dating the existing OPs. To meet this target there is a need of an alternative surveying technique having the potential to replace all surveying practices so far applied in CF. The present paper recommends to explore the potentiality of combining existing surveying system and remote sensing techniques in CF surveying in Nepal.

**Keywords:** Community forestry, forest boundary, surveying, forest map, Nepal

The Forest Act 2049 and By-laws 1995 (HMG, 1995) has indicated that boundary surveying is a mandatory process for handing over of forest area to community. For further clarity and uniformity in the process of CF implementation, a Community Forestry Operational Guideline 2052 has been enforced. Irrespective of the process used during boundary survey, a copy of a forest map must be included in the Community Forest Operational Plan. And, the most commonly used forest surveying techniques are Chain and Compass, and use of Cadastral Survey Map.

In Nepal various survey techniques are being used in different donor supported project areas. For example, Churiya Forest Development Project has used the Global Positioning System (GPS); the Nepal-UK Community Forestry Project (NUKCFP) introduced Orthophoto Maps as an alternative to the existing boundary surveying practices, and in the past decade, sketch mapping was heavily used by Nepal-Australia Community Forestry Project in Sindhupalchok and Kavrepalanchok districts.

Forest boundary surveying, despite being an important tool to support community forestry, is one of the least attended matters. Although forest boundary survey is related to the segregation of boundaries between forestland and private land, the customary practice of over looking some area of national forest that had been included previously into private land, has intentionally prompted forest encroachment. Conflict is inevitable if surveying of

such encroached land is done for re-including them in community forests. Hence turning blind eyes to such cases and handing over some portion of a national forest has become an usual practice. But, once the forest area have been encroached, or given to individual in that fashion, it is nearly impossible to reclaim thereafter, for there are no accurate and legally acceptable maps and records.

In this connection, the present paper which is based on the information collected from three mid-hills districts namely Ilam in the East, Dadeldhura in the Far-west and Lamjung in the Central Nepal, attempts to put forward a better option of forest boundary surveying for community forestry. A total of 160 randomly selected OPs (68 from Ilam, 34 from Lamjung and 58 from Dadeldhura districts) and attached maps are the basis of the present study.

## Acceptance of a map

The boundary of a CF may adjoin boundaries of many individual private lands. Cadastral survey maps (*Napi nakesa*) are the only legal basis for the demarcation of land ownership in Nepal (HMG, 2019). The provisions in that Act authorised the Survey Department to survey parcel boundaries and distribute land ownership certificates to the legal owners. Realising this, First National User Group Workshop has recommended the use of cadastral survey map in solving the demarcation disputes (Subedi, 1993). In this connection, legal acceptance of a forest map therefore, becomes a vital matter in CF.

<sup>1</sup> Assistant Research Officer, Department of Forest Research and Survey. P.O. Box 3339, Kathmandu

## Status of cadastral survey map

The present land surveying system by the Survey Department does not cover mapping of forest boundaries and forest parcels. Forestlands are surveyed only when they are suspected to fall within private lands. Thus surveyed system produced two types of Cadastral maps namely controlled and uncontrolled. The uncontrolled maps show private land in a blank paper which makes it very difficult to identify forest patches. Currently, 37 districts have controlled and 38 districts have uncontrolled Cadastral maps. The use of this map in the districts with uncontrolled references is difficult for CF surveying. Currently the Survey Department is updating the maps, that is, it is preparing controlled maps in nine districts.

## Choice of a surveying method

The choice of a surveying method depends upon a number of parameters such as time efficiency, cost involved, accuracy, simplicity of the method, trustworthiness, clarity of end results and legal status of the surveying technique, etc. Recently, most of these parameters were evaluated by Acharya and Boer (2000). Their findings suggest that the time taken for chain and compass survey is significantly greater in compare to the use of Cadastral survey map. However, the it also depends on the terrain, number of stations and size of the forest. On top of the time efficiency, use of Cadastral survey map requires fewer numbers of surveyors such as Ranger and Forest Guards in the survey team. Cadastral survey map had received highest trust rating compared to other survey techniques. It was found that uncertainty over legal recognition associated with other techniques was the main reason behind it. The Cadastral survey is the cheapest method.

The use of orthophotos generates more participation than chain and compass, and Cadastral survey maps. It is equally time efficient. However, it could be very difficult for a Ranger to work with this map without a good orientation. On the other hand, the forest technicians are most familiar with chain and compass survey and are inclined to produce a recent map (Acharya and Boer, 2000) through its use.

In the present context of community forestry where the rural people are the forest managers and work with the Rangers, the map thus used must include more references and details than those prepared for forest technicians. A community forestry map must include forest location, size, north direction, legends, appropriate scale and references. In addition, a user-friendly map can be produced by

including landmarks such as temple, forest road, rivers, streams and quarries, etc.

## Usefulness of the existing maps

Every OP had a map, but with a significant variation in their properties and qualities. Such maps are not useful to the extent as needed. Forest is surveyed recently, calculations are done and maps are prepared. Most commonly only straight lines are joined together in white paper with no references or any other information. This practice has resulted in the production of maps that are less useful to the users. Legends were not given properly. Basically, there are no useful maps in OPs. They only serve the need of hand over process as demanded by the Forest By-laws, 1995. They are not useful for planning purposes and are difficult to understand.

## Use of a scale

As the choice of a scale depends upon the size of the forest area and the objectives of the mapping, a wide range of scale were found to be used. Interestingly, scale is provided even in sketch maps. In addition, various scales (1:400 to 1:10,000) were also used even for same forest area. On the other hand GIS based colourful map has also been included in the OP (Bakuwa CF in Ilam District) covering an area of 315 ha with a scale of 1:25,000 (in a A4 sheet). Similarly, in Dadeldhura District 14.84 ha of land area was found to be shown in 1:20,000 scale. The preparation of too big maps or too small maps reduces their use and applicability.

## Surveying method

Chain and compass; Cadastral survey; and sketch mapping were found to be the most frequently used methods. Of them, chain and compass is the most common that covered 90 percent of the community forests studied. Remaining 10 percent was shared equally by rest of the two methods. Sketch maps were common in relatively old maps prepared up to the year 052/53.

## Area coverage and accuracy

There are no basic information available for comparing them with that of different survey techniques. The use of Cadastral survey map does not require field surveying. Ultimately, recently encroached forest area is also included within community forest. This situation has resulted variation in the map area and field area. On the other hand, in excessively encroached area, people preferred for a recent boundary survey (chain and

compass) to ensure that the encroached forest area is their private property. Such situation makes the forest surveying practice to overlook encroached area from the CF boundary. Practically a Ranger ignores the problem of forest encroachment and conducts the survey as shown by the users. In addition, it was observed that the distance interval between two survey stations was up to 1200 m in the map. In hill districts, it is not possible to make a straight boundary with no turns and bending of a kilometre or more. Such mapping reflects existence of improper surveying practices, and in future, may invite severe boundary conflicts.

### Blocking in maps

The Forest By-laws 2051 demands blocking of the community forest. Accordingly, all the OPs prepared after 2051 include blocking. The number of blocks varied from 1 to 16, but not all maps attached show blocks. About one third of them lack blocking and the rest are not free from criticism. During the blocking two survey stations were found to be joined by a straight line without considering the field situation. In some cases, the spatial position of forest blocks is also altered. The eastern blocks were shown on western part of the map and *vice-versa*.

### Future requirement

Sixty percent out of 5.5 million ha of Nepal's forest is identified as potential community forest (Tamrakar and Nelson 1990). A total of 738,810 ha (22 % of potential forest area) has been handed over to 9844 Forest User Groups formed until the mid of January, 2001 (DoF, 2001). It shows that a huge number of CF maps has to be prepared in future for the hand over process as well as for the revision of existing OPs.

The recent changes in the Community Forestry Operational Guideline, 2052 demands for the inclusion of forest inventory results in all OPs. To facilitate the process Inventory Guidelines For Community Forest has already been approved by the Forest Ministry. Forest inventory is not possible without a good map and the guideline presumes the existence of a surveyed map in each CF. However, the field situation opposes this assumption. It means that there could also be a need for re-surveying and mapping of all CF showing blocks and protection regime for the completion of forest inventory work. This situation needs to be analysed considering the manpower available in the districts, their efficiency and the existing work loads.

### Tackling the future

As mentioned earlier there is a need of updating of all existing maps of community forest. It is essential to make a brief review of existing survey techniques and their potential. Now-a-days the sketch map is used only for the reconnaissance survey and user investigation.

**Chain and compass survey:** Although, this is the most common and preferred method of survey by the field staff, the heavy work load a Ranger has, and considering his efficiency no one can be sure of up-dating of all the maps within a acceptable time. In addition, with the compulsory inclusion of forest inventory activity, the work load for a Ranger has increased. It means that the possibility of preparing a good map with this method for a large number of Forest User Groups is remote.

**Cadastral survey map:** This is the most cheapest method of forest boundary surveying. However, the use of this in 38 districts is limited due to their quality (uncontrolled maps). In the rest of the districts, their usefulness may reduce with the needs of blocking (stratification) as demanded by the recent inventory guideline. Moreover, forestry field staff are not familiar with this mapping procedure and its interpretation.

**Orthophotos:** The use of photomaps for forest boundary survey may have limited use though they are very useful to generate peoples' participation. This methods is also in testing phase.

**Global Positioning System:** The use of GPS for forest boundary surveying in CF is the least practised method in Nepal, and is generally believed to be expensive and unsuitable for hills. But it is not so, even if we compare with the material cost required for chain and compass survey. It can produce map in short time. Recently, most of the Districts Forest Offices are equipped with Pentium III computers, and therefore, the potential of using GPS in forest boundary and blocking in CF should be evaluated. As it reduces work load of field staff, their surplus time could be used for post-formation activity-a much needed work in the CF. The technical matters with GPS can be captured by Rangers as they are able to measure height and slope with recently introduced hypsometer and clinometer. Whether GPS works in hill or not should be verified through studies.

### Conclusion

Forest boundary surveying is a mandatory activity for hand over process in CF. A study of 160 OPs in

the three hill districts revealed that a map was attached in every OP studied. Most commonly such maps have only straight lines joined together in the white paper with no references or any other information. A significant variation in their properties such as survey methods, choice of a scale and forest blocking exists. Consequently the existing maps are neither useful nor informative. Virtually, there is no such map in OP with adequate information.

There is a need to prepare a large number of CF maps for hand over process and also for up-dating the existing OPs. To meet this target there is also a need of an alternative surveying technique which has the potential to replace the current ones. At the same time, capacity building of Rangers in preparing adequate maps is also required. Based on the above information it can be stated that the existing maps do not meet the criteria that a good map holds, and hence updating them is necessary.

## Recommendations

To improve the present mapping and surveying activities, the following recommendations have been given:

1. Irrespective of surveying methods used, maps should be informative. Updating them is therefore, necessary.
2. Developing a surveying manual for CF is a must.
3. Potentiality of using GPS or its combination with other methods should be explored. This could be any thing such as combining GPS and Cadastral survey map, photomaps with Cadastral survey map, photomaps with the GPS, photomaps with chain and compass survey, etc.
4. It will not be wise to search for a solution without considering the legal status of the techniques used. Hence, Survey Department

should also be consulted in developing a mechanism to overcome the legal issue. The maps prepared for planning purposes alone are not useful if it had a legal complexity and/or constraints.

5. It is necessary to identify an appropriate scale of CF map according to forest size.

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