Community readiness model for social forestry in Central Sulawesi, Indonesia

S Umar1*, S Yodo2, M Narawi3, H Pribadi1, S Samudin4 and W Prianto5

1 Faculty of Forestry, Tadulako University, Palu, Indonesia
2 Faculty of Law, Tadulako University, Palu, Indonesia
3 Faculty of Social and Political Sciences, Tadulako University, Palu, Indonesia
4 Faculty of Agriculture, Tadulako University, Palu, Indonesia
5 Post Graduate Program, Tadulako University, Palu, Indonesia

*E-mail: syukur_umar@yahoo.com

Abstract. Community Readiness Model (CRM) is a research method widely used in the field of public health. The purpose of the paper therefore is to review the implementation of CRM in Social Forestry field (SF) of Central Sulawesi Province, Indonesia by considering the unique intersections between the two concepts. Qualitative Systematic Review was used in this study involving 169 documents obtained through the search of electronic sources. The main result was on combining the dimensions of both the CRM and SF to produce an integration model which intersects and transforms social values, culture, traditions, and behaviour. Social innovation involving network, strategy, solidarity, and collective identity was intersected between the dimensions of CRM and SF to consider the intrinsic values of the village community. These four components were specifically related to partnership, governance, resilience, community and policymaker, livelihood, social cohesion, and integration. The application of CRM to Social Forestry in Central Sulawesi has the ability to optimize local wisdom teaching about the change and harmony of life to provide a balance between humans and nature.

1. Introduction
The Community Readiness Model (CRM) is usually applied to ensure the social dynamic process of a community is conducted effectively to achieve a better condition and to make sure structured and layered information is available according to the wishes of the community in resolving the prevailing problems in their society [1,2]. Since the introduction of CRM in 1994, its use has increased annually, especially in the United States [3]. It was reported to be mostly applied in rural communities and a significant change is observed in these areas compared to those in urban communities regarding physical activity and fitness for older people [2,4]. Therefore, CRM is the potential for community readiness to make changes based on certain issues, for example, those pertaining to health and social forestry to develop the livelihoods of the residents in a better direction.

The relationship between rural communities and CRM have been researched, however, there are limited discussions in other contexts such as between rural communities and social forestry, especially regarding agroforestry not only because of their origin but most importantly due to their potential contribution to the rural economy [5–10]. Thus, the countryside is an important intersection between the CRM and social forestry which is expected not only to bridge and strengthen the two concepts but
also provide broad regional resonance. Furthermore, social forestry revitalization is expected to occur in rural areas, especially by those living close to the forest.

Central Sulawesi Province has 4.2 million hectares of forest consisting of production at 42% and protected/conservation forests at 58%. The forest management is required to allocate 1% to 10% of the total state forest area to implement the concept of social forestry [7,11]. The concept is aimed to increase community participation in the management of production, protected and conservation forests in buffer zones and community forests outside the forest area. This concept of cohesiveness is a new paradigm, approach, and model/system of forest management in which forest is not only a resource but also an ecosystem functioning to provide direct and indirect benefits for people in a just manner. Social justice in forest management of Indonesia is a way forestry conflicts in Indonesia is being resolved [11]. It is not only applied in the management of production forests, but also in the management of the Lore Lindu National Park in Central Sulawesi Province which adopts the concept of a Biosphere Reserve to promote balance between humans and nature for social justice and ecosystem sustainability. Thus, the Lore Lindu area is an international management concept integrating conservation goals with cultivation goals to ensure the promotion of the balance [12,13]. It is, however, possible to achieve these objectives through the use of social forestry, especially agroforestry systems due to its effectiveness in acting as a refuge for local species, especially birds and grasses [14].

The disruption in the balance between human and nature can lead to changes in land cover due to the influence of both socio-economic and cultural innovation factors through the paradigm shift of the farming community from "food first" to "cash crop first" [15]. The idea of implementing social forestry/agroforestry is based on the presence of trees as an element of natural ecosystems on community-managed land to provide a variety of ecological and economic benefits and to solve the problems of climate change [16,17]. Social forestry has the ability to maintain an ecological balance and provide for several socio-economic needs of the community to increase diversity and ultimately improve the socio-ecological resilience of forest management.

With due consideration for the advantages and benefits of social forestry as a paradigm, approach, and system/model of land and forest management in rural areas, there is a need for more vigorous promotion for its adoption, especially through the use of agroforestry technology as a village community institution [18]. The purpose of this paper was to integrate CRM with the concept of social forestry, with the intersection between rural communities, CRM methods, and social forestry being the focus.

2. Theoretical Perspective

Figure 1 a and b, shows the national and regional implementation of social forestry.
The social forestry achievements of 2016 and 2017 showed an outstanding progress compared to what was obtained in 2010. Therefore, continuous efforts are needed to improve the new social forestry areas in Central and West Sulawesi provinces as well as in Gorontalo. The two provinces are challenged with the implementation of social forestry due to the number of villages within the areas. However, this is in contrast to South Sulawesi Province, where the number of villages closely located to forests is less than the other provinces.

Social forestry, CRM and rural community are the three components of this research with unique intersection as shown in figure 2. Society is a common element in all compartments, while the communities act as the social forestry actors in rural areas. In the CRM compartment, communities act as both objects and subjects.

**Figure 1.** National achievements of the implementation of social forestry in the period 2007 to 2017 (a), and regional one of Sulawesi by provinces in 2017 (b)

The daily life of inhabitants living in rural and farming communities is commonly shaped by agricultural activities and values, culture, and traditions. Although rural behaviours differ from those observed in urban communities, social network and strategy forms the basis for their adaptation to change [19,20]. These social networks and strategies are social innovation formed from the combination or hybrids of elements of values, culture, traditions, and existing behaviours to establish relationships across the differences existing between the groups of people living in the area. However,
there is no problem with differences in values and culture when these networks and strategies are existing in rural community life.

Networking can help rural communities realize better partnerships and governance to ensure inhibiting factors such as the complexity of the problem, weak administrative systems, and bad varieties of inheritance from the past are eliminated [21], and also plays a significant role in increasing the resilience of rural communities to changes [22]. Meanwhile, a strategy is very important in managing rural resources, especially by bridging the gap between rural communities and policymakers to ensure balance and workability between natural and human resources [23]. Networking and cooperatives are important strategies for rural communities to sustain livelihoods due to their ability to create jobs, boost food production, empower the marginalised, and promote social cohesion and integration [24]. Besides networking, cooperation, and strategy, the other main factors to deal with change and disruption are social solidarity and collective identity due to their important role as mediators between social heterogeneity and resilience [25]. In the context of social forestry, collective action is strongly influenced by the size of community groups and their perception of the existing forest management system [26].

The changes and socio-economic performances previously stated are important elements for the use of CRM as a model-based theory aimed at accessing and building community capacity to take action concerning social issues. Accessing behaviour and measuring changes in individual preparedness in the context of the broad business community is a necessity that needs to be conducted through interviews with key informants on the six dimensions of CRM including community effort, community knowledge of efforts, leadership, community climate, knowledge about issues, and resources [1,2].

A good change mechanism is determined by the involvement of three levers of motivation, capability, and opportunity [27]. Many factors are affecting social change to make it become a joint action and they include opportunity, ability, support, force, expectation, goals, values, and self-commitment [28]. Moreover, a good social change depends on the process of transformation of thought, behaviour, social relations, institutions, and social structure to produce benefits or outcomes for the community members.

3. Methodology

The information used in this paper was obtained from several electronic sources such as Science Direct, Google search, Web of Science, Doaj.org, and e-resources.perpusnas.go.id with the search conducted at the Tadulako University library. The theoretical study was conducted in connection with agroforestry research conducted by other reviewers through the use of CRM, especially in candlenut and coffee agroforestry research around Lore Lindu area. Qualitative Systematic Review was used in the study of the three compartment reviews previously stated, and several relevant publication articles were critically evaluated to define and clarify the problems. Moreover, previous investigations were summarized; relationships, contradictions, gaps, and inconsistencies contained in these articles were also identified to ultimately provide solutions to existing problems. Each paper is extracted in the same fashion to reduce the bias due to the involvement of subjectivity in the extraction of information [29].

Data and information were also arranged in a table to obtain the differences in several relevant results from different studies. The pre-defined keywords used in searching the literature are shown in Table 1 and this led to the retrieval of more than 169 pieces of literature in the form of articles, reports, and books.
Table 1. Keyword used

| Primary keyword          | Secondary keyword | Tertiary keyword                                                                 |
|--------------------------|-------------------|---------------------------------------------------------------------------------|
| Community readiness      | Model             | Theory, principle, readiness, behaviour change, social change, the model of change, networking, cooperative, solidarity. |
| Change                   | Social Forestry   |                                                                                 |
| Agroforestry             | Forest Management |                                                                                 |

The pieces of literature obtained based on the theme CRM was 35, method of review was 15, social change was 11, social forestry was 26, the intersection was 8, behaviour change was 25, agroforestry and rural was 39, and the others were 10. The subjectivity and objectivity approaches were used by considering several criteria such as audience, information sources, author, bias, and scope to maintain the quality of articles and the parameters were specifically determined to facilitate the search on the internet. The scope of the parameters was comprehensive enough to cover all relevant studies and specific enough to ensure the focus is on the issue of review. After the refinement of the literature, three criteria including community model review, seminal literature discussing prevalent theories and models (shortlisted), and literature applying the most prevalent theory to the analysis of social forestry, or other environmental readiness were used. The criteria used to determine the use of the article as a review material include the subject matter discussed by the article as well as its type and source while the relevance of the article to the topic of this paper is an important consideration compared to the author's agreement or disagreement with the results of the study. The three main compartments of this paper are CRM, social forestry, and rural communities.

4. Results and Discussion

The limitation of this review is the availability of information and articles about the use of CRM in social forestry. The concept of CRM was born from a study conducted by a team of researchers at the Tri-Ethnic Centre for Prevention Research [1]. At the development stage, this method was widely used to assess the level of community readiness concerning health issues, especially the problem of alcohol and narcotics dependence and control of cigarette addiction [30]. It was further explained from 60 studies using CRM in various countries such as the USA, Australia, Canada, Bangladesh, India, Liberia and others that 47.5% were conducted in rural areas, 30% in urban areas, and 17.5% in both rural and urban areas. Social forestry is believed to have a unique intersection with CRM as shown in Figure 1; therefore, this review has its challenges and expected to make a positive contribution to the development of the use of CRM, especially in social forestry.

The main result of this review is the integration model obtained from the combination of the dimensions of CRM on SF to produce the intersection and transformation of social values, culture, traditions, and behaviour. Figure 3 shows social innovation is an intersection between the dimensions of CRM and SF and also considers the intrinsic values of the village community with relations to network, strategy, solidarity, and collective identity. In detail, this relates to partnership, governance, resilience, community and policymakers, livelihood, social cohesion, and integration. This is expected to be an instrument to resolve several dilemmas caused by the existence of unequal relations, for example, the relationship between structural and political, non-equal components and imbalance between stability and fluidity and others [31].
Figure 3. Model of integrating CRM with SF

The intersection was created to show a different range of positions and used to understand the boundaries and hierarchy in social life [32]. The heterogeneity with social structure and boundary becomes a force of change used to develop an innovative society. Therefore, the development of a through network, strategy, solidarity, and collective identity has the ability to eliminate the possibilities of dilemma by all groups in the society.

One of the serious challenges associated with the implementation of CRM in the context of social forestry in Indonesia is the strong authority of the central government. Therefore, there are significant limitations associated with the development of local initiatives and a sense of justice in forest management. The development of social forestry are compiled in the form of an Indicative and Social Forestry Map (ISFM), which are compiled by the civil society, with difficulty in synergizing the social, cultural, and behavioral values. The social forestry schemes are customary forest, village forest, community forest, people forest plantation, and forestry partnership. In 2017, the area of social forestry achievements in Indonesia reached 1,224,851.48 ha with a total of 4,073 management units involving as many as 283,809 households [33].

Table 2 shows the implementation progress of the social forestry in Central Sulawesi Province. The Village Forest Scheme has been implemented by almost all districts with a total area of 8798 hectares in 14 villages. This achievement is similar to the data owned by the community forestry scheme, with a smaller number of districts. The people forest plantation and customary forest have each been carried out by Banggai, Tojoumauna, Sigi and Morowali Utara districts. The designated areas are protection and production forests, which have not been encumbered with management rights or utilization permits. To manage HD, the village head forms an institution and applies for management rights from the governor through the regent/mayor. However, these rights do not constitute ownership. The implementation of community forestry also exists in states by different management. Village forest business permits were granted to institutions, while community permits were granted to groups.
Table 2. Achievements in the implementation of Social Forestry in Central Sulawesi

| District       | Atribute       | Social Forestry Scheme |
|----------------|----------------|------------------------|
|                |                | HD  | HKm | HTR | KK | HA |
| Banggai        | Village        | 1   | 6   | -   | -  | -  |
|                | Household      | 101 | 301 | 38  | -  | -  |
|                | Unit           | 1   | 6   | 38  | -  | -  |
|                | Area(ha)       | 1,536 | 499.55 | 325 | -  | -  |
| Buol           | Village        | 5   | -   | -   | -  | -  |
|                | Household      | -   | -   | -   | -  | -  |
|                | Unit           | 5   | -   | -   | -  | -  |
|                | Area(ha)       | 1,283 | -   | -   | -  | -  |
| Donggala       | Village        | 2   | 7   | -   | -  | -  |
|                | Household      | 1,047 | 100 | -   | -  | -  |
|                | Unit           | 2   | 7   | -   | -  | -  |
|                | Area(ha)       | 2,055 | 3,364 | -   | -  | -  |
| Posos          | Village        | 1   | -   | -   | -  | -  |
|                | Household      | -   | -   | -   | -  | -  |
|                | Unit           | 1   | -   | -   | -  | -  |
|                | Area(ha)       | 3,094 | -   | -   | -  | -  |
| Sigi           | Village        | 4   | 1   | -   | 1  | -  |
|                | Household      | 474 | 922 | -   | 92 | -  |
|                | Unit           | 4   | 2   | -   | 1  | -  |
|                | Area(ha)       | 126 | 3,220 | -   | -  | 756 |
| Tojounauna     | Village        | 1   | -   | -   | -  | -  |
|                | Household      | 218 | 1,062 | -   | -  | -  |
|                | Unit           | 1   | 1,062 | -   | -  | -  |
|                | Area(ha)       | 704 | 2,873.7 | -   | -  | -  |
| Morowali Utara | Desa           | -   | -   | -   | -  | 1  |
|                | Household      | -   | -   | -   | -  | 120 |
|                | Unit           | -   | -   | -   | -  | 1  |
|                | Area(ha)       | -   | -   | -   | -  | 6,212 |

Source: adapted from Ministry of Environmental and Forestry [33] Remarks: HD (Forest Village Scheme); HKm (Community Forestry Scheme); HTR (People Forest Plantation Scheme); KK (Forestry Partnership); HA (Customary Forest)

The village forest scheme in Central Sulawesi Province has shown progress in developing non-timber and timber forest products as well as environmental services. The cultivated non-wood forest products are honey, coffee, rattan, candlenut, sugar palm, rambutan, and langsat, with waterfall previously managed by environmental service. The economic businesses developed in Central Sulawesi Province are relatively similar to those in other provinces in Indonesia. They develop timber and non-timber forest products, livestock and forest cultivation.

To increase the capacity of community institutions in the management of social forestry in Central Sulawesi so far they still rely on comparative studies as a program. While in other provinces a number of activities have been carried out to increase awareness, including training activities, agroforestry socialization, technical guidance, and so on. While the entrepreneurial capacity building of the social forestry group has been carried out various activities including providing facilities for preparing business plans.

The number of villages in Central Sulawesi Province involved in the Social Forestry program is 30 out of a total of 2020. Approximately 37 villages are in the forest, which is surrounded by 560 [34]. All villages in and around the forest area have a sizable portion, with 29% in the administrative area. According to SK Men KLHK No.869 / Menhut-II / 2014 SK 3,934,568 hectares, or 64% of the province's land area is used as a forest ecosystem. Motivation leads to community interaction which helps them to obtain fuel wood, maintain springs, rivers and irrigation which are important for their lives and activities. The forest is also a place where they can carry out farming activities that have
lasted for generations. Table 3 shows the number of villages in each district in Central Sulawesi Province based on their location relative to the forest area. Therefore, social forestry efforts still need to be promoted by prioritizing local governments and communities. Developing social capital and innovation based on local potential is in accordance with the mission of forestry, which is oriented to local-based forest management that promotes sustainability and equitability.

The numbers of villages with two dependence factors on forests are greater than those surrounding it. This information is an indication of the strong population pressure on forest sustainability which will further increase the rate of deforestation and degradation. Social forestry plays a good role in realizing harmonization in accordance with the level of community readiness used. CRM standard instruments get adjusted in the context of social forestry and socio-cultural local communities; therefore, it touches the social values that apply in the local community.

| District               | Number of villages | Villages inside the forest | Villages around the forest | Village with firewood as cooking fuel | Village with burning land as a habit |
|-----------------------|--------------------|---------------------------|---------------------------|--------------------------------------|-------------------------------------|
| Banggai Kepulauan     | 144                | -                         | 10                        | 133                                  | 140                                 |
| Banggai               | 337                | 7                         | 98                        | 256                                  | 173                                 |
| Morowali              | 133                | -                         | 52                        | 90                                   | 69                                  |
| Poso                  | 170                | 8                         | 79                        | 143                                  | 103                                 |
| Donggala              | 167                | 10                        | 47                        | 102                                  | 74                                  |
| Toli-Toli             | 110                | -                         | 42                        | 60                                   | 45                                  |
| Buol                  | 115                | -                         | 50                        | 107                                  | 92                                  |
| Parigi Mautong        | 283                | 3                         | 97                        | 201                                  | 123                                 |
| Tojo Unauna           | 146                | 9                         | 89                        | 114                                  | 116                                 |
| Sigi                  | 177                | 23                        | 76                        | 138                                  | 73                                  |
| Banggai Laut          | 66                 | -                         | -                         | 53                                   | 49                                  |
| Morowali Utara        | 126                | 8                         | 74                        | 106                                  | 84                                  |
| Kota Palu             | 46                 | -                         | 5                         | 6                                    | 3                                   |
|                       | Total              | 2020                      | 68                        | 719                                  | 1509                                | 1144                                |
| %                     | 100                | 3.4                       | 35.6                      | 74.7                                 | 56.6                                |

Source: Adapted from BPS Central Sulawesi [34,35]

Central Sulawesi Province consists of 13 districts and cities, however, only 7 or 54% have implemented four of the five social forestry schemes found in Indonesia. One form of social forestry that has not been formally categorized as a scheme is community forestry. The use of CRM in issues outside of public health is expected not to present any problem due to its application to the assessment of people's readiness for ocean renewable energy [36], and understanding food access [37]. Furthermore, it was also applied to assess the readiness of university students in hazing prevention [38]. This trend emerged in 2012, and since 2016 it has been adopted for general use [39]. Therefore, the application of CRM in the field of research and development of social forestry can be tested, especially since social forestry and health share the same intrinsic character by relating to humans as individual as well as social creatures.

CRM is the degree of community readiness used in assessing and evaluating actions related to certain issues [2]. Dimensions of leadership, financial resources, and local knowledge or expertise as important factors are combined by CRM to make changes in society regarding specific issues [4]. It is also a multi-dimensional construction which combines factors of attitude, perception, and knowledge of certain issues, resources and leadership [40]. Analysis and synthesis of the CRM dimensions existing in the definition are obtained by two groups of keywords which are leader, community, and resource or component entity as the first group, and effort, knowledge, and attitude as the second or relationship group. These entities are physical objects like the community and object-concepts such as leaders and resources that are more independent and stronger while the second group is the result of
the relationship between one or more entities, for example, effort as the relationship of entity community through unary degree, or as the relationship of entity community and leader through binary degree. Moreover, there is also the possibility of a ternary degree of relationship through the entities of effort, community, leader, and resource.

The application of CRM in developing SF in Central Sulawesi has the ability to utilize the wisdom of local communities in managing lives. Positive and spiritual values embodied in local wisdom guide local communities to behave well in managing forest resources and the environment. Local wisdom teaches about the harmony of life such that, if properly maintained, it provides a balance of bonds between humans and nature [41]. and changes in a community behaviour require a long time, especially if it involves foreign elements [42]. However, the involvement of the community in the change process moves the inherent catalyst to desire a change for the better [43], and this is social wisdom as well as necessity required to be incorporated in making several planned changes to have a better direction by specifying conditions required to overcome their problems.

The purpose of CRM is to change the community to a better level of preparedness where initiative and attitude/perception are important factors or drivers other than the CRM dimension to optimize the community’s capacity for change [44], [45]. In the context of CRM on social forestry, the potential to change is an intrinsic readiness capacity or the initial state of readiness of a community in which the process of change develops and increases to a certain time. Thus, the concept can be defined as a potential of change and a function of community capacity such as knowledge, relationships, and resources, leadership such as the ability to access resources), and capability like future change. This definition reaches nine levels of community readiness involving the component entities and relationships previously stated.

Change is a necessity and an integrated part of life faced by humans at the individual and social level during their lives through the stages of growth and development. There are several explanations for the process of social change and they are all grouped into linear and cycle change models. This is due to the fact that humans and groups each have values as an individual, society/community, and group all of which play a role in change [46]. Change is the dynamic of interaction occurring in the community's readiness system indicated by the presence of social innovation in society due to the interactions between one or more CRM entities that produce constantly evolving relationships. The families of social forestry farmers need to have self-consciousness, congruence, and commitment to collaborate based on mutual respect for differences or controversy with civility at the community group level to achieve common goals.

5. Conclusions
The use of CRM in SF development in Central Sulawesi Province is an opportunity to optimize SF implementation to realize sustainable forest management oriented towards justice and community welfare. Integrating the dimensions of CRM with those of SF and incorporating local social, cultural and cultural values have the ability to produce social innovations in the form of network, strategy, solidarity and collective identity to control and manage heterogeneity which is the power of change. Social innovation is a social intersection between CRM, SF, and the rural environment as well as a forum for agreement on several existing differences. Adopting CRM in SF implementation is a change that shows the dynamics of social interaction occurring in the community's readiness system and it has positive consequences for community participation and direct role in the SF system to freely determine the life processes in sustainably managing forests.

Acknowledgment
The authors acknowledge the financial support of the Research Program of Tadulako University for 2020-2021 session (Contract Number: 363.n/UN28.2/PL/2020). They are also grateful for the valuable comments and inputs from some ristekdikti/Untad researchers.
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