# Typology of Constraints and Recommended Solutions for the Agroforestry in the Cascades Region of Burkina Faso

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***Abstract*****—** *The tree-crop and / or animal association is a source of many ecological and socio-economic benefits, but it's facing various constraints. The main objective of this work is to identify constraints and solutions to improve the agroforestry level in the Cascades region. Specifically, it aims to identify the units of management; list the agroforestry techniques used; identify the levels and types of constraints and recommended solutions. Interviews were conducted with the supervisors of agroforestry activities from technical public offices, researchers, partners and producers from 10 villages selected according to their specificities. They focused on agroforestry practices, constraints and solutions in the management of tree-crop fields, riverbanks, nurseries, plantations and direct seedings with forest tree seeds. A typology of the constraints was made and consisted in listing them, classifying them in different types and levels. These results highlighted six kinds of units on which eight agroforestry practices were found; 41 constraints were listed, classified in three (03) levels then in 10 types. Finally, 14 solutions are recommended by the interviewed actors to remove these constraints. A synergy of actions between the actors will allow better development of agroforestry in this region.*

***Keywords— Agroforestry, Parklands, Constraints, Solutions, Cascades Region.***

## I. INTRODUCTION

Agroforestry is the set of systems and techniques of soil development with trees and crops association and / or animals to obtain useful products or services for humans [1]. This association is simultaneous according to a spatial arrangement either or in a temporal succession. The three distinct components are the ligneous species, annual crops and animals. The animal component, although existing, is not always materialized, so in the case of the fallows the tree-crop association is sequential [2].

Thus, the agroforestry has a socioeconomic character with measurable benefits both ecologically and socially. Its practice must be developed in the production systems. The technological packages must be available for the farmers in order to improve their local knowledge's and popularize various practices. Agroforestry techniques require, to be adopted, a good knowledge of pedological, climatic, material and financial conditions and a commitment of the farmers. Agroforestry is developed in all climatic zones in Africa where the tree is integrated with crops to improve mainly crop performance and the ecosystem goods and services it provides [3; 4].

Since the 1950s, agroforestry researches have been conducted in the western Burkina Faso [5; 6; 7; 8]. However, this region has not benefited greatly the support of the projects and programs such as the northern, sahelian and southern regions of the country [9] [10] [11]. Many of the constraints that have been the subject of this study are hampering agroforestry practices in the western regions, particularly the Cascades region. The identification of these multiple constraints and the proposal of adequate solutions will allow a better practice of agroforestry. The present study has been initiated, taking into account this situation.

The global objective was to make the best understanding of the agroforestry practices and constraints. Specifically, it was (1) to identify management units; (2) list the techniques used; (3) identify the types and the primary, secondary tertiary levels of constraints to agroforestry development among the stakeholders; and (4) propose solutions to minimize or even remove these constraints.

## II. MATERIAL AND METHODS

### 2.1 Site of the study

The site of the study was the Cascades region located in the extreme south-western of Burkina Faso. This area extends between 9 ° 25 and 10 ° 37 north latitude and between 3 ° 50 and 4 ° 46 west longitude. Ten villages sheltered the study: Diarbakoko, Duna, Kiribina, Kossara, Niarébama, Siniéna, Sitiéna, Tengrela, TiéTiékouna, Wolonkoto. These villages have

been the sites of previous agroforestry researches [12][13]. The climate of the region is Southern Sudanian [14] characterized by a wet season (April to November) and a dry season (November to March); temperatures ranging from 17 °C to 36 ° C and mean annual rainfall of 1000 mm to 1200 mm. In this region, we find different types of soils: battleship outcrops, vertisols on fluvial alluvium and hydromorphic soils. Between the two there are some little evolved non-climatic origin [15] [16]. The vegetation is dominated by all types of savannah including wooded savannah, trees, clear forest, and gallery forest and graminaen carpet in decline. The researches on the major floristic types of agroforestry parklands in Burkina Faso [17] showed that the Cascades region's parklands are dominated by *Borassusa keassii*, *Blighia sapida* and *Faidherbia albida* in the vicinity of human dwellings and by *Vitellaria paradoxa* and *Parkia biglobosa* in the bush fields.

### 2.2 Data collection

The information sought in this work focused on the use of agroforestry techniques; the constraints encountered and the solutions identified by the different actors. The data was collected from stakeholders in the four thematic groups (Table 1). The eight studied techniques are the Assisted Natural Regeneration (ANR), enrichment plantations, windbreaks, hedgerows, direct seedings, controlled clearings and animal parcages. About nurseries the three private nurseries of Siniéna, Diarabakoko and Tingrela were concerned. The preoccupations were their creation, their equipment, their functioning, and the plant's production-flow. For the technical services the information collected focused on the different agroforestry practices, the activities of the producers and the administration in the Cascades region, the constraints of implementation of each practice during the technical frameworks, the obstacles to agroforestry in general in the Cascades region. The constraints are listed on the questionnaires sheet in descending order of importance.

**TABLE 1**
**THE VILLAGES SAMPLED ACCORDING TO THEIR SPECIFICITIES IN AGROFORESTRY**

| Specificities Villages | Tree-crop fields and Fallows | Riverbank Protection | Nurseries | Plantations-Direct seeding |
|---|---|---|---|---|
| Diarabakoko | | X | X | X |
| Douna | X | | | |
| Kiribina | X | | | X |
| Kossara | | X | | |
| Niarebama | | X | | |
| Siniéna | X | X | X | |
| Sitiéna | | X | | X |
| Tiékouna | X | X | | |
| Tingrela | | X | X | |
| Wolonkoto | X | | | X |

### 2.3 Data management

To assess the importance of agroforestry practices (p), a rating scale has been established [18]: 1) Low practice (1% ≤ p≤24%); 2) Unimportant practice (25% ≤p≤49%); 3) Moderately important practice (50% ≤p≤74%); 4) Important practice (75% ≤p≤100%). The percentages calculated represent the proportions of farmers who have adopted the concerned agroforestry practice.

A list of constraints has been established on the basis of the results of the interviews with all the stakeholders. A classification of the constraints was made in three groups according to the proportion of the producers (P) who identified them. They are tertiary when 1% ≤ P ≤25%; secondary when 26% ≤ P ≤50%. If 51% ≤ P ≤100% they are qualified as primary [19]. A second classification focused on the type of the constraint that can be natural, anthropogenic, social, etc.

Concerning the recommendations of the farmers and technicians, the actors to whom they were formulated are indicated. Indeed, a group of actors makes recommendations for both the group and their technical and financial partners.

## III. RESULTS

### 3.1 The main management units and works carried out

The main management units encountered in the villages are the fields exploited continuously. These are fields of annual crops associated with ligneous trees which according to their location are house fields (CDC); village fields (CDV) and bush fields (CBD). In these units, producers perceive the positive and negative aspects of the tree-crop interactions. Another type

of management unit is the fallow where a period of rest of the soil is observed between two growing periods. Fallows are becoming scarce and their duration is shortened, about three to four consecutive years. To these are added the riverbanks and the courses or sylvopastoral zones. With regard to the riverbanks, the sensitization of users (farmers, breeders, fishermen) concerns 1) the maintenance and respect of a restriction area along the Comoé River which crosses the villages sites; 2) the use of pesticides; 3) the use of local utilitarian species introduced on the riverbanks. The frequencies of these activities depend on the financial supports available for the supervisors. In addition to the local utilitarian species planted on the riverbanks by the producers, other exotic species are planted there. They are *Eleais guineensis*, *Voacanga africana, Griffonia simplicifolia Carapa procera, Raphia sudanica*. The animal routes are distant from the river and have many herbaceous species and woody forage including *Borassusa keassii, Faidherbia albida, Diospyros mespiliformis*. By direct seeding, *Mucuna pruriens* and *Mucuna deeringiana* are associated with woody plants to enrich the rangelands and the soil of fallow. To meet the needs of local plants the private and community nurseries are installed in the villages.

### 3.2 The techniques used, their importance and links with the useful species of parks

There are eight most representative agroforestry practices at the study sites (Table 2). The Assisted Natural Regeneration (ANR) is a practice whereby peasants save, maintain and protect young volunteer agroforestry species from animals. The ANR concerns multipurpose species such as *Borassusa keassii, Vitellaria paradoxa, Parkia biglobosa, Mangifera indica, Sclerocarya birrea.* Enrichment planting is forest seedlings at the locations desired by the grower to meet a specific need. They are done in the fields to improve wood diversity. Live hedges are dense plantations and aligned with trees (about 1.50 m high) whose many branches obstruct men and animal routes. In the study villages windbreaks are found and their role is to protect the crops against the harmful effects of the winds. The farmers learned how to make hedgerows and windbreaks for wood production, non-timber forest products and the provision of ecological services. They are essentially made of *Acacia nilotica, Gmelinaarborea, Senna siamea. Jatropha curcas* was also introduced into hedgerows (Figure 1). Direct seeding of forest seeds is particularly relevant to *Borassusa keassii* and other local species such as *Parkia biglobosa, Faidherbia albida.* Their seeds require pre-treatment with sulfuric acid. Most of the projects that have occurred in the region have been forest seed distribution and subsidy channels from the National Forest Seed Center (CNSF) either for seedlings produced in nurseries or for direct seeding. Controlled land clearing is a practice in which farmers choose and save both mature and young trees in the fields. Animal parcage represent the association of the three crop-tree-animal components of an agroforestry system. In the dry season, the animals kept in a pen, retreat under the trees defecates, creating ranges of soil fertility heterogeneity.

**TABLE 2**
**THE MOST REPRESENTATIVE AGROFORESTRY PRACTICES IDENTIFIED ON THE MANAGEMENT UNITS**

| Management units Agroforestry practices | CDC | CDV | CDB | Improved fallows | Riverbanks | Animal routes | Total |
|---|---|---|---|---|---|---|---|
| ANR | 3 | 3 | 4 | 3 | 2 | 3 | 18/24 |
| Plantations of enrichment | 2 | 3 | 3 | 3 | 3 | 1 | 15/24 |
| Windbreak | 1 | 2 | 3 | 3 | 3 | 2 | 14/24 |
| Live fences | 1 | 2 | 3 | 2 | 4 | 2 | 14/24 |
| Direct seeding | 2 | 3 | 2 | 1 | 2 | 3 | 13/24 |
| Thorny fences/dead fence | 2 | 1 | 2 | 1 | 3 | 1 | 10/24 |
| Controlled clearings | 1 | 1 | 3 | 2 | 1 | 1 | 09/24 |
| Animal parcages | 0 | 1 | 2 | 1 | 0 | 2 | 06/24 |

***75%≤p≤100% : Importante practice, p= 4; 50%≤p≤74% Practice moderately important, p= 3 ; 49%≤p≤25% : Pratique peu importante, p= 2; 24%≤p≤1% : Low pratique, p= 1 ;p=0 for inexistente practice in the management unit.***

The table 2 presents the eight practices and their importance in the management units. It appears that ANR are important in tree-crop fields, fallows and rangelands. Enrichment plantings are moderately important in CDV, CDB, improved fallows and on riverbanks. Live hedges and windbreaks are mostly practiced in the CDB and on the riverbanks. Direct seeding is not commonly done; however, it is moderately important in the CDV and the rangelands. Except for the riverbanks, dead hedges are sparsely distributed. They are present in CDC managed by women, especially on the riverbanks for the protection of vegetable crops. Controlled clearing land is more prevalent in CBD, while animal parcages are practiced with low importance on CBD and rangelands.

**Figure 1: Live fences of *Jatrophacurcas* around the ligneous nurseries of Tengrela, Comoé**

### 3.3 Typology of constraints to the practice of agroforestry

***Constraints*:** A total of 41 constraints were listed and their proportions evaluated (Figure 2). The most important ones experienced by more than 80% of the producers are the lack of water, the land problems, the financial insufficiency for the regular execution of the activities and the lack of follow-up by the technical services. The interviews revealed that the populations of the villages of Tingrela, Nekanklou, Tiékouna and Sitiéna refuse the establishment of multipurpose woody species plantations proposed by the MCA-BF for the riverbanks protection. This reluctance emanates from the village of Tingrela where it is known that the increase of the human population makes it necessary to exploit the fertile lands of the riverbanks. The problems with the Comoé River, Lake Tingrela and the rivers of the village sites are summarized in their anarchic exploitation: the silting of the river which results in floods and early drying up; the almost total absence of plant formations; the use of chemicals in market gardening and gold panning for the ores washing. These products are harmful to human and animal health. Some consequences linked to the bad use of pesticides are the drying up or even the death of the plants (figure 3) and especially the fish of the Silurus genus dominating in the water reservoirs. Four pesticides are commonly used on the riverbanks: Emacot 019 (Emamectin benzoate 19 g / l), Lambdacal P 315 EC (Lambdacyhalothrin 15 g / l), Decis 10.75 EC (Deltamethrin 25 g / l) and Cypercal P 330 EC (Cypermethrin 30 g / l). Another constraint revealed is that during the plowings, woody regenerations are desiccated except those already identified and spared by the producers. To this constraint is added the grazing and trampling of the regrowths by the wandering animals despite the surveillance of the producers and the obligation made to the pastors to borrow the cattle tracks identified. There is also the destruction caused to plantations by elephants and hippopotamuses which are particularly important in the villages, especially in Diarabakoko, Niarébama, Tingrela. In the Cascades region, the practice of agroforestry faces land issues related to customary and modern rights. There is also a lack of manpower in the area due to field work and socio-economic activities. These last activities, although temporary, are consuming young work force. It was found that the lack of good quality of forest seeds is a constraint with a aggravating factor that is the collection of immature fruits of ligneous trees such as *Parkia biglobosa*, *Vitellaria paradoxa*, *Sclerocarya birrea*. For financial interests, women make premature picking of fruits; ripen them early by using carbide in order to sell them. Finally, parasitic attacks (*Plodia interpunctella*, *Acantho slides obtectus*) have a negative influence on the quantity and quality of the seeds of these fruit trees.

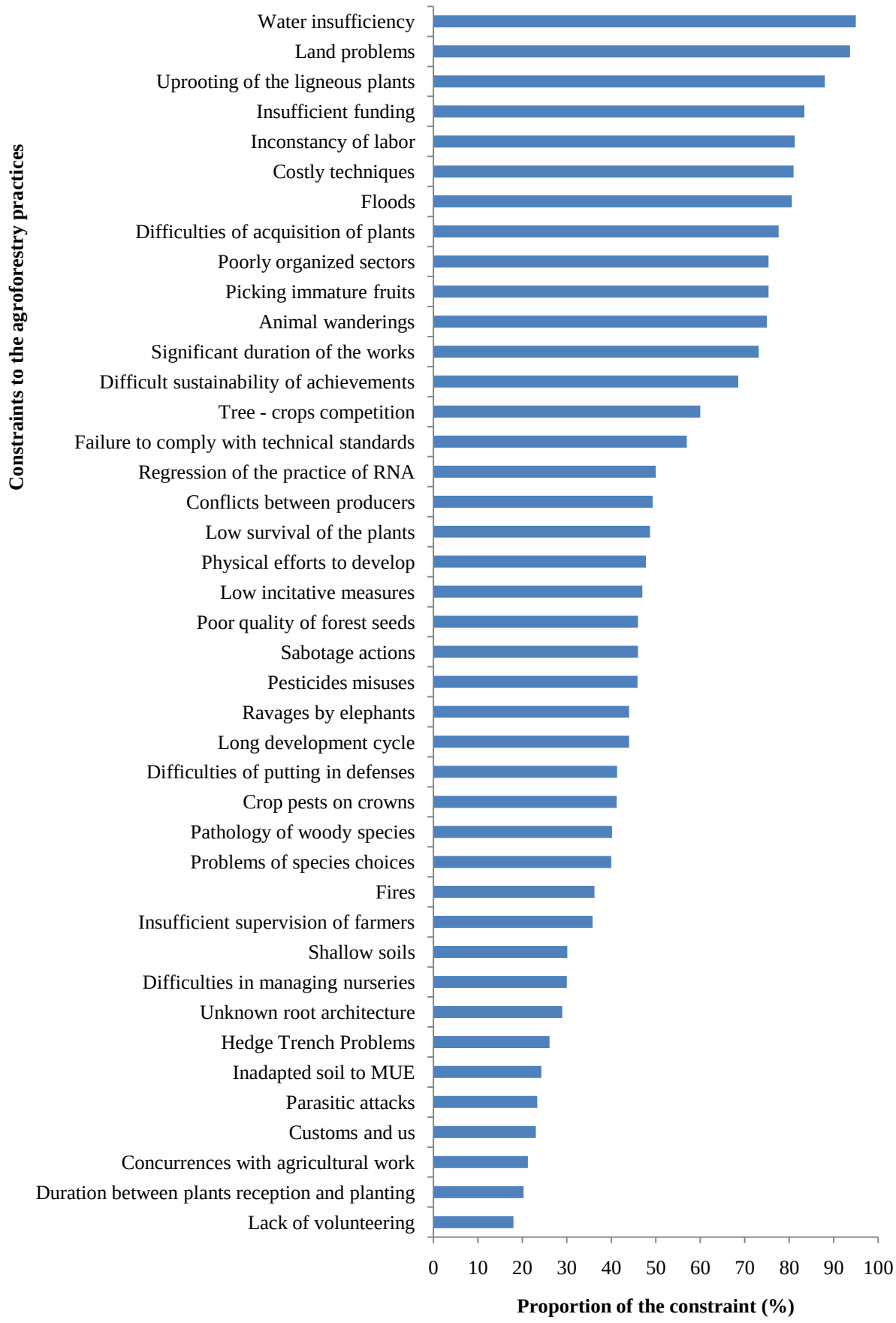


**Figure 2: The different constraints enumerated by the agroforestry practicers**

**TABLE 3**
**THE TEN TYPES OF CONSTRAINTS IDENTIFIED**

| N$^0$ | Type of the Constraint | Constraint |
|---|---|---|
| 01 | Technical | Picking immature fruits |
| | | Significant duration of the activities |
| | | Duration between plants granting and plantation |
| | | Problem of trenches of live fences |
| | | Insufficiency of supervision |
| | | Misuse of pesticides |
| | | Poor quality of forest seeds |
| | | Low survival of plants |
| | | Regression of RNA practices |
| | | Non compliance with standards |
| | | Ligneous uprooting |
| 02 | Anthropogenical | The fires |
| | | The elephant ravages |
| | | Animal wandering |
| 03 | Biological | Unknown root architecture |
| | | Long cycle of development |
| | | Tree-crop competition |
| 04 | Social | Competition with agricultural works |
| | | Inconstancy of the workforce |
| | | Lack of volonteering |
| | | Costums and us |
| | | Difficulties of nurseries management |
| | | Problem on species choices |
| | | Difficulties of defens |
| | | Sabotage actions |
| | | Conflicts between farmers |
| | | Sectors poorly organized |
| | | Land problems |
| 05 | Climatic | The flows |
| | | Water insuffisance |
| 06 | Financial | Difficulties to get plants |
| | | Cotums and us |
| | | Insuffisancy of financial supports |
| 07 | Mécanical | Physical effort to develop |
| 08 | Natural | Crop pest on the crowns |
| | | Parasitic attacks |
| | | Ligneous pathology |
| 09 | Pedological | Inadapted soils to MUS |
| | | Shallow soils |
| 10 | Strategical | Low incentives dispositions |
| | | Difficulties to sustain gains |

**Figure 3: The drying of *E. guineensis* caused by the pesticides on the riverbank of Siniena**

***The levels of the constraints:*** The results indicate 39.02% of primary constraints, 46.34% of secondary constraints and 14.64% of tertiary constraints. Referring also to Figure 4, the lack of water, the land problems, the difficulties of seedlings acquisition, the insufficiency of funds for the execution of the works, the application of the techniques according to the required standards are now the main constraints for the development of agroforestry in the Cascades Region. It means that these constraints have been recognized by more than 50% of respondents as major constraints. The riverbanks are exploited to minimize water and soil fertility problems. The law 034 on land ownership is not rigorously applied. It is the traditional land tenure system that largely prevails in land management. Local agreements consist of negotiating land with customary authorities and Village Development Committees (CVD):. These agreements are not valid acts from the point of view of the law. These Committees are involved in the management of the land but land chiefs ensure the granting or the loan of plots of exploitation. The inheritances of plots are from father to son; Loans require both the agreement of the owner and the chief of land often materialized by ritual sacrifices. Land tenure, dominated by short, medium or long-term loans, does not promote agroforestry. There is an implied prohibition on the loan recipient trees except *Borassus akeassii*. In addition, the latter undertakes to release the parcel as soon as the owner or his descendants need it.

The constraints of lesser incidence include parasitic attacks, habits and customs, the lack of voluntary spirit among producers for work trials and time management difficulties during the field work when it is reduced on annual crops. Indeed the customary requirements in the management of the plots borrowed or the reluctance of some producers for the introduction of new agroforestry species such as the *Vocacanga africana* are constraints. The highest proportion of constraints is secondary (46.34%).

***The types of constraints:*** Ten types of constraints have been specifically distinguished as well as the impacts that can result (Figure 4), among which are recognized anthropic, biological, climatic, financial, mechanical, natural, pedological, social, strategic and technical constraints . As shown in Figure 4, each constraint type has two or three of the primary, secondary, or tertiary levels, except for the biological, mechanical, and pedological types that are characterized by a single level. The soils of the Cascades region are agronomically more suitable than those of several other localities. Their handicaps for agroforestry are perceived as tertiary constraints.

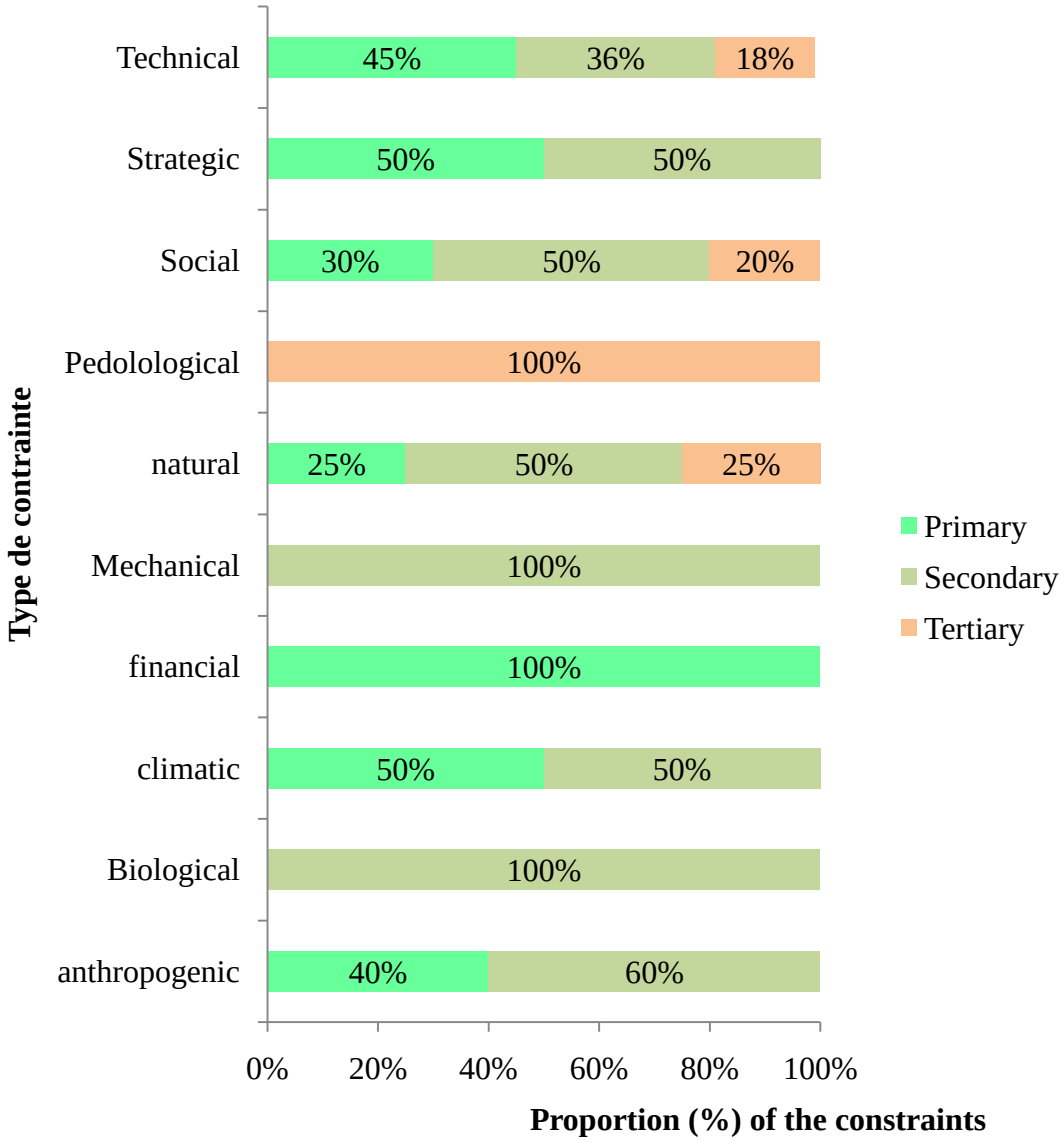


**Figure 4: Proportions (%) of the constraint level staking into account the identified types**

### 3.4 The recommended solutions to improve the practice of agroforestry

The search for solutions and suggestions with the producers, the technical partners, the Forestry officers responsible for carrying out the work related to the different aspects of agroforestry led to the results presented in Table 4. It appears that these solutions, recommendations and suggestions made by the interviewees are addressed to the four types of actors involved in agroforestry: the producers, the technicians of the Regional Directorate in charge of the Environment and their partners, the researchers and the decision-makers. Two solutions concern all the actors whereas those which address simultaneously to three types of actors are five in number: the recommended solutions for the valorization of the techniques WASC-DRS and the forage species engage the producers, the technicians and the researchers of the domain. Those relating to practical training, the synergy of actions between specialists and the promotion of agroforestry techniques through the execution of projects and programs are the responsibility of technicians, researchers and decision-makers. The other solutions concern different combinations of two types of actors. They aim mainly to improve the practice of the ANR, the reduction of the farmer-pastoral conflicts, the land security, the use of the pesticides, the awareness against the bad practice of the fires, the management of the densities of the trees in the fields and revision of the list of protected species. The misuse of pesticides is known to be dangerous for humans, animals, plants and natural resources in general. Forest officers educate producers in this area. These are important targets for capacity building for the use of these chemical products. Recommendations for training extend to all technical services (public, NGOs) and researchers.

**TABLE 4**
**THE PRECONISED SOLUTIONS AND SUGGESTIONS TO THE DIFFERENT GROUPS OF ACTORS**

| N⁰ | SOLUTIONS-SUGGESTIONS | FARMERS | TECHNICAL OFFICES | SCIENTIFIQUE RESEARCH | DECISION MAKERS |
|---|---|---|---|---|---|
| 01 | Train the farmers to the techniques of pushing back the elephants | | | | |
| 02 | Take reoressive actions against the collectors of pods and immature fruits | | | | |
| 03 | Revalorize WASC/DRS techniques to limit water problems | | | | |
| 04 | Valorize the fodder ligneous to reduce the conflicts farmers-breeders | | | | |
| 05 | Practice ANR to reduce the plantation constraints | | | | |
| 06 | Set up exchanging frameworks between farmers and breeders | | | | |
| 07 | Precede the trainings by the practices | | | | |
| 08 | Establish a synergy of actions between environmental, livestock and agricultural ffices | | | | |
| 09 | Demand the promotion of the agroforestry techniques in the ESMP of the projects | | | | |
| 10 | Go on sensitizing the different actors on the law 034 related to land tenure | | | | |
| 11 | Strengthen the capacity of the farers in the pesticide uses | | | | |
| 12 | Sensitize the people against the bad practices of fires | | | | |
| 13 | Continue the works on the densities of the ligneous species to keep on field | | | | |
| 14 | Review the list of the protected species | | | | |

***Colored parts = Concerned actors; WASC/DRS = Water and Soil Conservation/Defense and Restoration of Soil; ANR=Assisted Natural Regeneration; ESMP= Environmental and Social Management Plan***

## IV. DISCUSSION

A variety of agroforestry practices on various land use systems exist in the agrarian landscapes of the Cascades region. This work reveals that agroforestry is also developed in the Western and South-Western regions, which are among the most watered and fertile lands of Burkina Faso. The importance of agroforestry is well appreciated by farmers in this region who, according to earlier works, recognized that the tree in the field increases soil moisture, lowers soil temperature, slows down soil loss through erosion and improves crop yields [6]. It is therefore a science for both arid, semi-arid and humid areas [20]. While agroforestry is practiced in all areas, it should be noted that it is not universal in its logical conception. Indeed the association of crops with trees differs widely according to the place. Formerly practiced on a large scale to meet the needs of soil fertility, fallow is no longer relevant for most farmers faced with insufficient arable land and when the use of fertilizers and pesticides seems to be an alternative. Climatic conditions, soil conditions, socio-economic and cultural conditions are all factors that make agroforestry unique in an environment site [6]. The techniques and floristic composition are closely related to the services and goods provided by the tree component of the system [21] [19]. The main park species are *Borassusa keassii, Mangifera indica, Parkia biglobosa, Vitellaria paradoxa, Faidherbia albida* and *Anacardium occidentale* [6].The choice of species obeys the rule of the producer interests through the goods and services that result. The application of the eight techniques described evokes multiple obstacles, but in the first place the constraints inherent in agroforestry as a whole are legion. Their typology in the Cascades region, as shown in Table 3 and Figure 7, highlights a variety of major, secondary and tertiary constraints. Each type of constraint has one or more levels. Primary-level land issues are common in many parts of Africa and Burkina Faso, as in the Cascades region. In the face of customary conceptions, many difficulties prevent the application of land tenure rules and legal rights related to land and trees. These difficulties often hinder the realization of the potential ecological and socio-economical benefits of agroforestry in many areas [3]. In addition to the climatic problems that result in water shortages, land issues are the most important to deal with in the Cascades region. Faced with the refusal to

evacuate populations (whose fields are located on the easement strips) with regard to riverbank development, and to give large portions of land to women to take gender into account, many projects and programs have failed. Women have very few rights to set up agroforestry parklands as they are the main users of wood and non-timber forest products [21]. The foundation of all work related to agroforestry is the availability of seeds and seedlings for the implementation of different agroforestry techniques. The technical problems related to seed management, the lack of financial support for production costs, the differences between the plant granting and the planting are factors that limit the availability of seedlings. Similarly, failures in the organization of agroforestry sector actors in the management of private, village or communal nurseries, reinforced by the inconsistency of the customer, hamper the production of nursery plants and their flows [22].

The animal wandering is also a serious handicap to the development of agroforestry techniques both in the Cascades region and throughout the country, as evidenced by the constraints listed in several localities. In fact, the major pressures on plantation and RNA seedlings stem from trampling and grazing by animals on the banks of several wetlands [8] are perceptible through the plantations of *Eleais guineensis, Carapa procera, Bambusa vulgaris, Raphia sudanica* but some efforts remain to be made, including the respect of the band of servitude of 100m wide on both sides of the river. Among the constraints, we found the inconstancy of the workforce for the reason that it is an industrial, commercial and tourist zone. It is recognized that in the city and the surrounding villages, the workforce is scarce and expensive during the periods of temporary employment offered by industrial and tourist activities. From the production of sugarcane over large areas to industrial production and the harvesting of raw materials, juvenile labor is absorbed. The numerous secondary constraints are mainly technical, anthropic, natural and biological types. The poor survival of seedlings and the misuse of pesticides result from the lack of technical supervision, which is also a consequence of the lack of financial resources in the technical services to ensure regular monitoring of field work. The work of the Regional Direction in charge of the Environment of the Cascades region in collaboration with the MCA-BF and the Woul Association illustrates the weakness of the survival rates, variable from a species to another: *Eleais guineensis* (61 , 48%), *Carapa procera* (13.92%), *Bambusa vulgaris* (6.78%), *Raphia sudanica* (10.97%) [7]. To increase the survival rate of all species, it is imperative to take steps against the mismanagement of seeds, the effects of long periods of flooding on these sites, the misuse of pesticides and the animal grazing. This means that the focus should be on the work and provisions that contribute to maintaining the viability and quality of tree seed, the desensitization of river beds, the protection of the riverbanks from erosion, replenishment of gallery forests, protection of flood areas, awareness of pesticide use, respect for grazing areas and animal corridors. Moreover, concerning the lack or insufficiency of financial resources, it is notable both for producers and technicians. In the Cascades region, the major obstacles to the development of agroforestry are anthropic, social and natural. They are accentuated by ignorance and / or rejection of good practices by some traditional leaders. Flooding, the collection of immature seeds, the ravages of elephants, the lack of volunteer spirit for testing work are also considerable constraints. Technical supervision schedules experience regular lags due to flooding [21]. Thus, on the basis of the results we obtained and although the constraints seem specific for each climate zone, we agree with some authors [18] that the limits to the development of agroforestry are at the level of four types of resources: material, land, human, financial and informational.

While natural barriers such as floods remain difficult to overcome, those of a socio-cultural and administrative nature require more commitment from rural populations, technicians and financial managers. So far investments are concentrated in the Sahel, northern and arid regions of Burkina Faso [23] [24] recognized as being highly vulnerable to soil degradation factors and to host the priority actions. However, the wetter areas should be better taken into account in order to sustain the assets already accumulated and thus develop more agroforestry.

## V. CONCLUSION

Based on the present work and referring to the constraints identified by various works on agroforestry in Burkina Faso, the recommended solutions to strengthen agroforestry in the Cascades Region should aim first and foremost to resolve land issues by sensitizing the various stakeholders on Law 034. This law guarantees the land security without which sustainable actions cannot be developed in an agroforestry system. It provides legal provisions including the certificate of land ownership. There is a compelling need for technical services in general and forest services in particular to be provided with financial, material and logistical resources to ensure effective management of their activities, as awareness, capacity building and technical capacities are their responsibility.

For financial partners, projects and programs, a broader vision of the areas of activity should be considered. Consensus should be constantly sought between producers and technical services in the choice of activities to be carried out. Since the success of the Research-Development projects and programs depends on producer buy-in, the consensus sought for the

promotion of plant species and technologies is an asset to take into account farmers' desiderates. It is important to take into account all the climatic zones of the country so that agroforestry will fully play its role of prevention and remedy to the problems of agrosylvopastoral productions.

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