Shelter-belt plantation project

Combating Desertification, Malnutrition and Poverty in Mali

Project proposal

Friends of the Dogon / Les Amis du Peuple Dogon

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Contact:

Audie Hazenberg, Vice-President, Friends of the Dogon
audie@friendsofdogon.org; audiehazenberg@yahoo.ca
Tel: +41 79 554 5035
Mamadou Guindo, Responsable de Terrain, Friends of the Dogon
Tel: + 223 79 37 69 68

1. Summary

Drought and climate change are exacerbating desertification in the Sahel, threatening subsistence farmers who are already among the poorest people in the world. Desertification also increases carbon emissions into the atmosphere, a process which can be reduced or even reversed by carbon sequestration when land management practises are changed to protect the soils[1]. Planting fast-growing, drought-resistant trees helps to stabilize the soil, store rainwater and provide fruit, fodder, mulch, natural insecticide, shade and medicinal benefits both to support the local population and to generate income. Encouraging plant growth and improving soils through mulching are effective measures in the rehabilitation of soils[2] and the fight against desertification[3].

In Doundiourou village in Mali's Dogon region, the Swiss-registered non-profit association Friends of the Dogon / Les Amis du Peuple Dogon is supporting a women's cooperative Mere-odjou in its efforts to combat poverty, malnutrition and desertification. We have already helped the cooperative establish a sheep-rearing livelihood project that is self-sustaining, set up a chicken and egg raising operation in the village, supported internally displaced people when the village took them in during political unrest, and we continue to fund an ongoing school meal program. We are looking for your support to fund a plantation / shelter belt of moringa, Jatropha and fruit trees, and an associated plant nursery of multi-purpose tree seedlings and medicinal plants. The tree seedlings are intended to supply the village shelter belt and any surrounding communities who wish to participate in the Green Belt movement, in an area where transportation costs can be prohibitive to starting such projects.

The plantation of moringa, Jatropha and fruit trees will supply on-going benefits to the village beyond soil stabilization. The plantation and subsequent ground cover through mulching will reduce erosion and evaporation, effectively raising the groundwater level. Moringa is a fast-growing, drought-resistant tree, and its highly nutritious leaves and seed pods are considered super-foods. Jatropha curcas (also known as pourghère) produces oil that is a natural insecticide when combined with the leaves of neem trees (that already grow in the village); excess seeds can be sold. All the fruit trees in the plantation will supplement the ongoing school meal program and bring in revenue through sales in the regional market. The plantation will be run communally, and the income generated will support a community contingency and credit fund.

The seedling nursery will promote afforestation efforts in the region and produce drought-resistant seedlings of various fruit species for sale each year. It will also collaborate with the Centre de Référence de la Médecine Traditionelle to produce and sell medicinal plants. Within a year this nursery will be self-sustaining, generating income to fund its maintenance and possible

[1] Lal, R. (2001). Potential of desertification control to sequester carbon and mitigate the greenhouse effect. *Climatic Change 51*, 35–72.

[2] Mando, A Brussaard, L., & Stroosnijder, L. (1999) Termite- and mulch-mediated rehabilitation of vegetation on crusted soil in West Africa. *Restoration Ecology*, *7*(1), 33-41.

[3] Bielders, C. L., Lamers, J., & Michels, K. (2001). Wind erosion control technologies in the West African Sahel: The effectiveness of windbreaks, mulching and soil tillage, and the perspective of farmers. *Annals of Arid Zone, 40*(3), 369-394

expansion, providing employment and developing skills for villagers, and supplying trees to a region where afforestation efforts are thwarted by the absence of available seedlings.

The total cost of the project is 2,799,500 franc CFA ($6,135 CAD) and it will be self-sustaining after the first year. The plantation will be run cooperatively, bringing income for the fund that supports 1800 villagers. It will also provide an organic crop insecticide for 1800 villagers annually; provide fenced pasture for the village sheep; and fruit and moringa will provide nutritional supplements for the school (136 students). The trees planted around the village and across the region will help combat desertification and improve soil and water resiliency throughout the area. Although beyond the project timeline, the fruit trees planted annually from the nursery will also become a significant and increasing source of both revenue and nutrition in the future.

2. A brief history of the organization

Friends of the Dogon (FOD) / Les Amis du Peuple Dogon is a small non-profit association registered in Vaud, Switzerland, with no political or religious affiliations. Our mission is to support Mere-odjou, a women's cooperative formed in the village of Doundiourou, Mali. All of our work is completely voluntary with no overhead costs; all money raised goes directly to the village association to fund their own initiatives (bar banking fees).

Our shared objectives with Mere-odjou are: 1) to combat poverty with sustainable livelihoods, 2) to address malnutrition, 3) to improve access to education, particularly for girls and 4) to combat desertification by planting fast-growing, drought-resistant, multi-purpose trees.

We started as a small group of friends with strong ties to Africa, having lived, worked and travelled there for years. Our president (Serge Pfister) and vice-president (Audie Hazenberg) both worked for Médecins sans Frontieres in Sudan, Congo and Ethiopia. Our treasurer (Henri Kuokkanen) is an academic economist specialising in corporate social responsibility; our advisor (Craig Stoddart) is an entrepreneur. Our secretary (Saakje Hazenberg) works in forest and nature conservation, and together with Craig, made friends with the villagers of Doundiourou during a cycling trip in Mali in 2002. Our field coordinator (Mamadou Guindo) lives in Doundiourou and has taken a 4-month CEAP (Champs école agro pastorale) course given by the FAO, after which he organized a group of 25 households and trained them in agriculture techniques and in cooperative saving and credit. He is also the secretary-general of Mere-odjou, acting as a liaison, as the women of the cooperative do not speak French and none of them are literate. Sebastien Soulier (hydrogeologist and founder of Interacta, a consultancy firm offering technical support to international development actors) has recently joined FOD as an advisor in technical matters pertaining to water and sanitation, bringing his extensive experience of project planning and implementation in Africa. It was Mamadou's friendship with Saakje and Craig from their travels that led to founding FOD. For further biographical information of the members, please see the attached Annual Report.

In 2014, as drought reduced crop yields and the insurgency in Mali destroyed tourism income, the women of Doundiourou formed the cooperative. They had ideas for combating poverty and malnutrition in the village, but no means of initiating any of them. After two years of unsuccessfully lobbying the regional government for support, Mamadou reached out to Saakje. As a group, we sent money to purchase 20 lambs for the women to raise and sell at a profit; around half of the revenues were reinvested in replacement lambs for other women and the profit kept as household income. This made such an impact that we decided to increase our support and registered FOD as a non-profit association in Vaud in January 2017. In our first year, we collected donations to complete the sheep project to a stable and self-sustaining flock of 45 ewes. Currently, sheep are the only regular source of income in the village; every 6 months each woman in the cooperative earns around 43 CHF. This money has already helped them to alleviate hunger last autumn when the harvest was late and the granaries were empty.

In October 2017 we started our second project, providing hot school meals. This helps to combat malnutrition and encourages parents to send their children, particularly daughters, to school. School attendance rose by 30% after the meals began. For now, the meals still depend on our continued support, but the establishment of the proposed project for a plantation and nursery would supply nutritional produce directly to the school and would generate income to take over funding the program eventually. For now, increasing access to literacy in this largely illiterate village, especially for girls, is an important investment in capacity-building.

In 2019, increasing unrest and violence in Mali led to a surge in internally displaced people; Doundiourou took in 150 people fleeing violence and FOD supporters stepped in to help accommodate them by providing them with shelters, mosquito nets and food for 3 months before the next harvest when they could plant their own crops. With FOD funding, the villagers also built a community chicken coop and started a chicken and egg raising project, which continues to flourish today.

In 2022, in addition to supporting the ongoing school meals, we aim to work toward our four objectives through the proposed project of planting a shelter belt of multi-purpose trees on the edge of the village. This will help to counter environmental degradation, reduce the village's vulnerability to climate change, and address our sustainable livelihood and nutrition goals. Eventually they will also contribute toward self-sufficient school meals.

Please find our first annual report attached in Appendix A. More information is also available on our website http://friendsofdogon.org and on Facebook @FriendsofDogon.

3. A brief description of the situation

Doundiourou is a village of 1,800 people in the rural community of Dourou (a collection of 29 villages with a combined population of 19,400) in the Dogon Plateau in Mali, part of the Sahel zone 700km east of Bamako (see maps in Appendix B). The village is at the foot of the Bandiagara escarpment on the edge of the desert. The villagers are subsistence farmers who grow millet, sorghum, cowpeas, peanuts, onions and fonio. Traditional handicrafts were previously sold to tourists and some young men worked as guides in the area before the

insurgency in the north of the country destroyed the budding tourism industry. Drought and insect infestations have caused crop losses for the past 5 years, leaving people hungry and forcing young men to migrate to look for work in cities. The only regular money coming into the village is from the sheep-rearing project; no one in the village has paid employment and only onions and small quantities of cereals can be spared to sell at markets to buy cooking oil, salt and other basic necessities. Occasional manual labour pays 1.80CHF for an 8-hour day, but this is rare, with families providing almost all labour themselves.

The village school employs 3 teachers who are from outside the village and paid by a regional body (the villagers pay half the salary of one of the teachers). Students start school at the age of 7 and are taught in French; 20 students each year will continue to secondary school in Inndarou, 4km away. Approximately 8% of the village is literate. There are 10 small solar panels in the village for charging phones and electric lanterns, but no running water. There are several mobile phones, including 2 smart phones, and poor cellular coverage reached by standing on hut roofs. Cooking is all on wood or charcoal fires.

There are no economic or health statistics for Doundiourou, but a survey of Mali in 2013 reported the highest levels of chronic malnutrition in children (stunted growth) in the Mopti region, which includes Doundiourou. The Mopti region also reported an elevated infant-juvenile mortality rate of 111 deaths/1000 live births. There is a caregiver with 3 months of training in the village to help with the 3 most common health issues, which are malaria, diarrhea and malnutrition; his office was built by another small association formed by a French couple who have visited the village several times and who supply ongoing medicine (Association Doundiourou). The closest medical clinic is in Bandiagara which is a 4-hour journey on foot and by shared bush-taxi (motorized tricycle). Other transport is by donkey, camel or ox-cart.

Mamadou, our field coordinator, attends farmer field schools and initiated a community contingency and credit fund in the village several years ago. He also took a rural extension course on nutrition in 2018, after which he organized a group of villagers to start a vegetable garden in Doundiourou. He has also begun raising tree seedlings on a small scale to increase his expertise in tree handling. The village organisation includes a general assembly overseeing an administrative council which initiates projects. For each project there is a 3-person surveillance committee to ensure that the administrative council follows the plans agreed upon by the assembly. Mamadou sits on the administrative council, so that projects supported by FOD are not answerable only to Mere-odjou but have the support and agreement of the whole village. Governance and accountability are managed with great transparency at the village level. In addition to Mamadou and the women of Mere-odjou, we now have contact with two other men from the village council.

The desert is gaining ground every year, accelerated by recurring drought and climate change. A few campaigns in the region try to combat this by planting trees and protecting native vegetation, but the efforts are not sustained and are hampered by a shortage of available seedlings adapted to the climate. Currently, the main suppliers of seedlings are all very distant from the region, in Sikasso (530km), Bougouni (715km), Bamako or Burkina-Faso, making transport risky for the seedlings and too expensive for the local populations. However, due to the importance of the threat, demand for cheaper, locally grown seedlings exists.

In response to this regional need for both environmental protection and tree products, and to improve livelihoods in the village by improving nutrition, creating employment, building skills, enhancing agricultural productivity and generating income, the villagers would like to start a plantation of multi-purpose trees for their own use, as well as developing a plant nursery of drought-adapted seedlings to supply other villages in the region.

4. Project objectives and duration

Project aim: To improve nutrition, livelihoods and resiliency and to meet the needs of the village and surrounding communities to protect against the advance of the desert through long-term and self-sustaining tree, fruit and medicinal plant production.

Specific objectives:

- Establish a plantation / shelter belt of 100 moringa , 100 Jatropha (pourghère) and 100 fruit trees for the village; the plantation will be expanded annually with fruit trees from the nursery.
- Create an operational plant nursery to produce and sell quality plants for the region.
- Train staff to specialize in producing quality plants adapted to the local conditions..
- Produce at least 100 seedlings every year of each of the following drought-resistant multi-purpose trees: plum, kapok, koronifin, mango, shea, baobab, néré, tamarind, “fromager” and jujubier, selling at least 1000 seedlings per year (this quantity can easily be scaled up to meet demand from communities and associations).
- Plant and maintain at least 100 seedlings per year for Doundiourou village itself.
- Collaborate with the Centre de Référence de la Médecine Traditionelle (CRMT) to produce and sell medicinal plants (kenkeliba, bouaye, armani and farmani).

Duration:

This is a 1-year project; establishment of the village plantation and the nursery will be completed within one year. The second year will be a proof of concept, as plants become established and teething problems are sorted out. After this time, the sale of seedlings and medicinal plants will fund ongoing operations and expansion of the plant nursery. The nursery will supply seedlings for a steady expansion of the village plantation, and plant products (moringa, Jatropha oil and fruit) will supplement village nutrition and agriculture and support the community fund. With time, this fund will also assume responsibility for the school meal program, but that is expected to take several years.

5. Project description

A. Village tree plantation:

A fenced area will be built near the borehole to provide protection from animals, and 100 moringa,100 Jatropha and 100 fruit tree seedlings will be transported into the village to start the

shelter belt plantation. Building the fences and watering the young trees will provide paid employment for several villagers for the first six months until the trees are well-established. After this, running the plantation will be a cooperative effort between 50 willing participants from the village, who will share the work of maintaining the fencing, pruning and harvesting moringa, fruit and Jatropha seeds, and supplemental watering. They will be recompensed by sharing some the produce of the plantation, while a portion will supplement the school meals; most will be sold and proceeds put into the village fund.

Jatropha starts to yield seeds after 9-12 months and reaches full yields (15-20kg / tree) in 2-3 years. Although marginal land produces smaller yields, the primary purpose here is soil stabilization, with insecticide oil a secondary benefit. In its first year, moringa produces fruit and can grow up to 5m; in 3 years, each plant will produce 400-600 pods annually.

Every year, 100 fruit tree seedlings from the nursery will be added to the plantation. These will start producing fruit in 3-7 years depending on the species, and full crops in 10-15 years. Therefore, this significant source of produce is not included in the 3-year forecasts but will bring in substantial nutrition and income with time. Tamarind, for example, can produce up to 175kg of fruit per tree per year when mature. Tamarind and néré (African locust bean) trees also fix nitrogen, which will contribute to soil fertility. Néré has highly valued seeds used in the nutritious condiment dawadawa, and the seeds are traded widely across West Africa. Many of the trees that the nursery will produce also have medicinal uses or produce fibres or oils in addition to fruit.

As the plantation becomes established, it will work synergistically with the village sheep-rearing project, which is already self-sustaining. Once the trees are big enough to escape browsing, the treed enclosure will provide shade and pasture for the sheep, who can benefit from fallen moringa leaves, while manure from the animals will fertilize the plantation. The dry leaves will also provide ground cover/ mulch, slowing evaporation and reducing temperature fluctuations and run-off, particularly when combined with controlled run-off techniques. It may be feasible in the future to expand the flock from the current 45 sheep. Similarly, as fruit trees start to produce, fruit will supplement the school meals and be distributed among the workers, while some will be sold for the community fund. Moringa will become a nutritious addition to the school meals and will also be sold. Jatropha seeds will be processed into oil in the village and used on the local crops as an organic insecticide to boost crop yields. This is increasingly important as climate change is predicted to lead to more frequent and more intense insect infestations. Excess seeds can be sold for making soaps and insecticide. The trees will provide a shelter belt protecting against the spread of the desert, stabilizing and improving soils, shading them from wind and sun and improving water retention.

B. Plant nursery:

A second fenced area will be built near the borehole, and seeds and equipment will be brought in to establish the seedling nursery and medicinal garden. Plants will be protected from animals, and staff will be trained to water and care for the seedlings. At the same time, with the help of school directors, information sessions in the regional schools will raise awareness of the issues of desertification and the need to protect vegetation and plant trees. Similar awareness sessions

will be held through traditional gatherings in surrounding communities in collaboration with local leaders. Reforestation campaigns will be organized in conjunction with the water and forest service and the local villages. Proceeds from selling seedlings to surrounding communities will sustain and expand the nursery, as will the sale of medicinal plants in collaboration with the Centre de Référence de la Médicine Traditionnelle (CRMT). CRMT is an Italian-run NGO in Mopti which buys medicinal plants from village producers in the region and processes them for sale to pharmacies across Mali and beyond, creating a dependable market for the plants.

For the nursery, the community will provide its own contribution to the project in the form of volunteer labour to build the fences, plant and care for the initial seedlings, and give talks in schools and villages; they consider this a demonstration of their motivation and community support for the enterprise. After 6 months, when commercialization of seedlings begins, the nursery will provide work for 3-4 staff, whose salaries will come from plant sales. Tree species raised will be primarily fruit trees but some also produce oils, fibre or medicinal products; these are plum, kapok, koronifin, mango, shea, baobab, néré, tamarind, “fromager” and jujubier.

Local villagers who have already worked with the CRMT will help to establish the medicinal garden in the nursery and train staff in exchange for a portion of the medicinal plants cultivated. This garden will include kenkeliba, bouaye, armani and farmani plants. (Kenkeliba is a popular bush tea, known as the “tisane de longue vie”, with more antioxidants than green tea; it is sold and drunk year-round but has a particularly important market during Ramadan, when it is used by Muslims to break their fast).

The subsistence farmers of the region are entirely dependent on the land for their livelihood, and are already suffering from increased drought and loss of arable land due to climate change. They also rely on local trees and shrubs for all their cooking energy. Planting shelter belts around the villages is therefore an important investment in the future, even at the small scale the communities can afford. Despite poverty, willingness to invest in tree plantation thus exists, creating a market for seedlings. Additionally, the nursery has chosen to grow multi-purpose trees that will provide benefits beyond soil stabilization, ranging from fruit production to nitrogen-fixing to marketable medicinal products, offsetting the costs to villages.

C. Budget

Trees	Quantity	Unit price	Total in F CFA	Total in CAD
Purghère plants	100	1000	100 000	219
Moringa plants	100	1000	100 000	219
Fruit trees	100	1000	100 000	219
Transport of plants	300	350	105 000	230
Work equipment				
Wheelbarrows	5	45 000	225 000	493
Shovels	10	4 000	40 000	88
Pickaxes	5	3 500	17 500	38
2-wheel cart	1	100 000	100 000	219
Donkey	1	75 000	75 000	165
Barrels	3	10 000	30 000	65
Watering cans	10	5 000	50 000	110
Sprayer	1	75 000	75 000	165
Plant protection	200	1 500	300 000	658
Fence mesh wire	20	30 000	600 000	1315
Rebar corner support	30	1 500	450 000	986
Welding			100 000	219
Galvanized wire	1	50 000	50 000	110
Fastening wire	5	4 000	20 000	44
Cement bag	6	6 000	36 000	79
Entrance gate	1	50 000	50 000	110
Labour	-	50 000	50 000	110
Technical Assistance	-	60 000	60 000	132
Depreciation (10%)	-	66 000	66 000	132
Total Budget			**2 799 500**	**6125**

6. Monitoring / evaluation

During the construction and establishment phase, the field coordinator will send brief weekly updates reporting on the state of progress and any complications encountered so that issues can be addressed quickly. Expenditures will also be recorded as they occur, so they can be tracked against the budget to ensure transparent use of funds. The coordinator will also track outreach efforts, logging the number of students and members of the public who attend the information sessions and following up with communities interested in afforestation.

As the seedlings grow, their health will be monitored closely to see how they respond to different regimes, so that local expertise can be developed in the nurturing of various species

and the most robust ones can be identified. Seedling survival and sales will all be logged and reported. At 6 months, as commercialization and afforestation efforts begin, a full report of progress and expenditure will allow for an assessment of how well the targets are being met, and whether production must be adapted by shifting emphasis on faster-growing or more resilient species. In the same vein, after each reforestation effort, the planted site will be revisited for follow-up monitoring after 1 month and after 3 months to check on survivorship. An emphasis will be placed on continuous learning and adaptive management based on the monitoring, so that nursery staff can be allowed to develop true expertise.

After one year, seedling production, planting and sales will be compared to the defined goals to evaluate the effectiveness of the project and to set targets for the next year. By this stage, the sale of plants will fund the continuing development of the nursery and external funding will no longer be required. In case of a serious setback, Friends of the Dogon would assume financial responsibility for operation until self-sufficiency. All income from sales of seedlings and plant products will be recorded, and an estimate of the harvests of vegetables and fruits that the solar pump enables will be used to measure the impact on livelihoods. If feasible, an estimate of the usual crop loss to insects will be compared to the current harvest to assess effectiveness of the organic insecticide from the Jatropha oil.

After this point, annual production and financial reports from the nursery and the village plantation will be used to assess long-term project effectiveness, but ongoing monitoring of planted areas will continue every 3-6 months to assess afforestation and reforestation success and to learn from tree survivorship.

7. Appendices

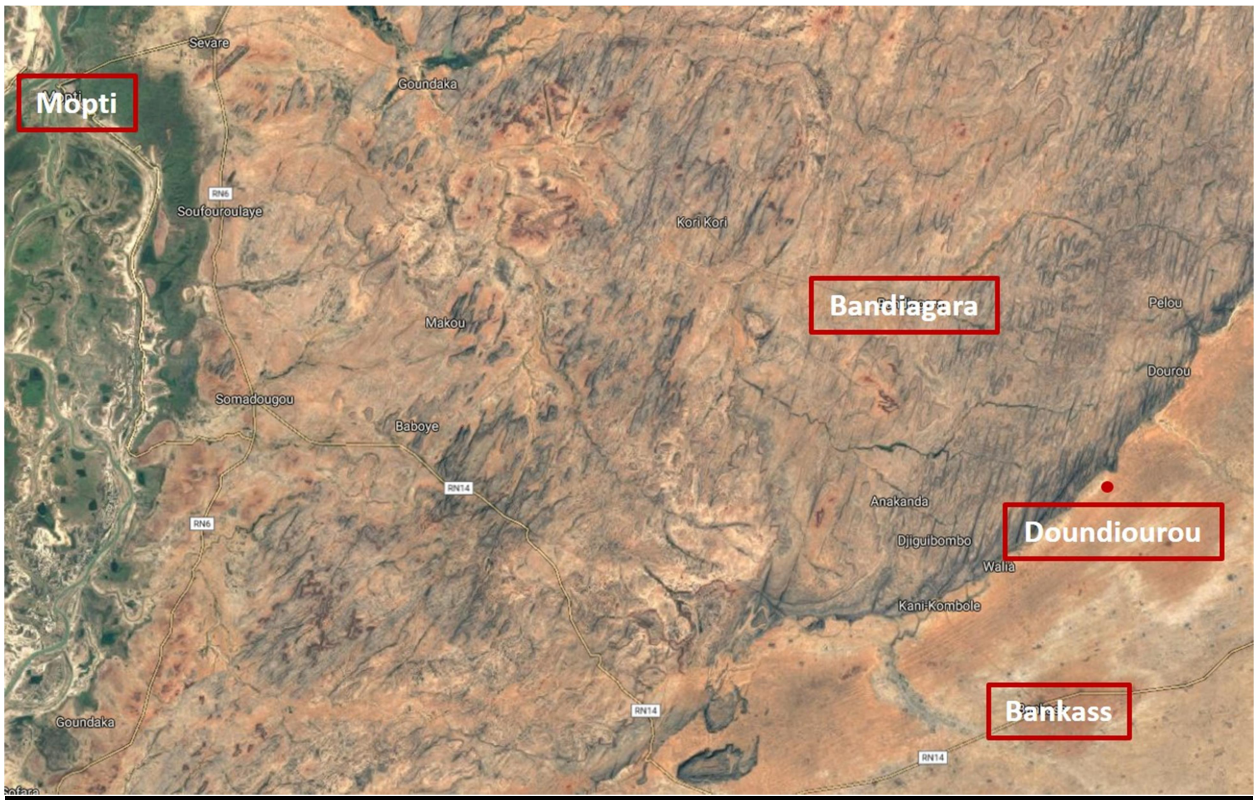
Appendix A: Annual Reports of the Friends of the Dogon

Annual report since 2017 are available at:

Appendix B: Maps showing the location of Doundiourou

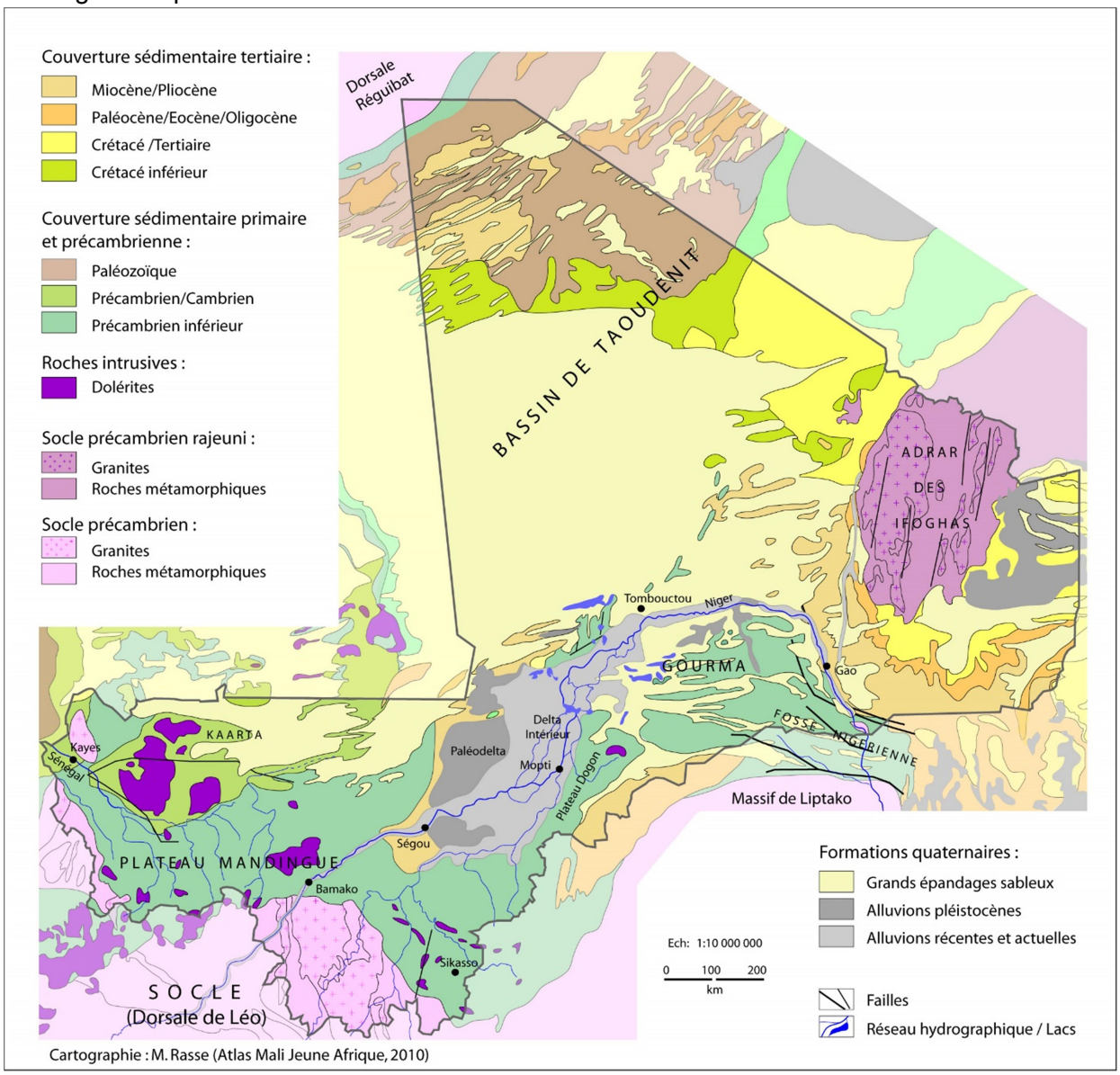
1) Map of Mali

2) Regional map



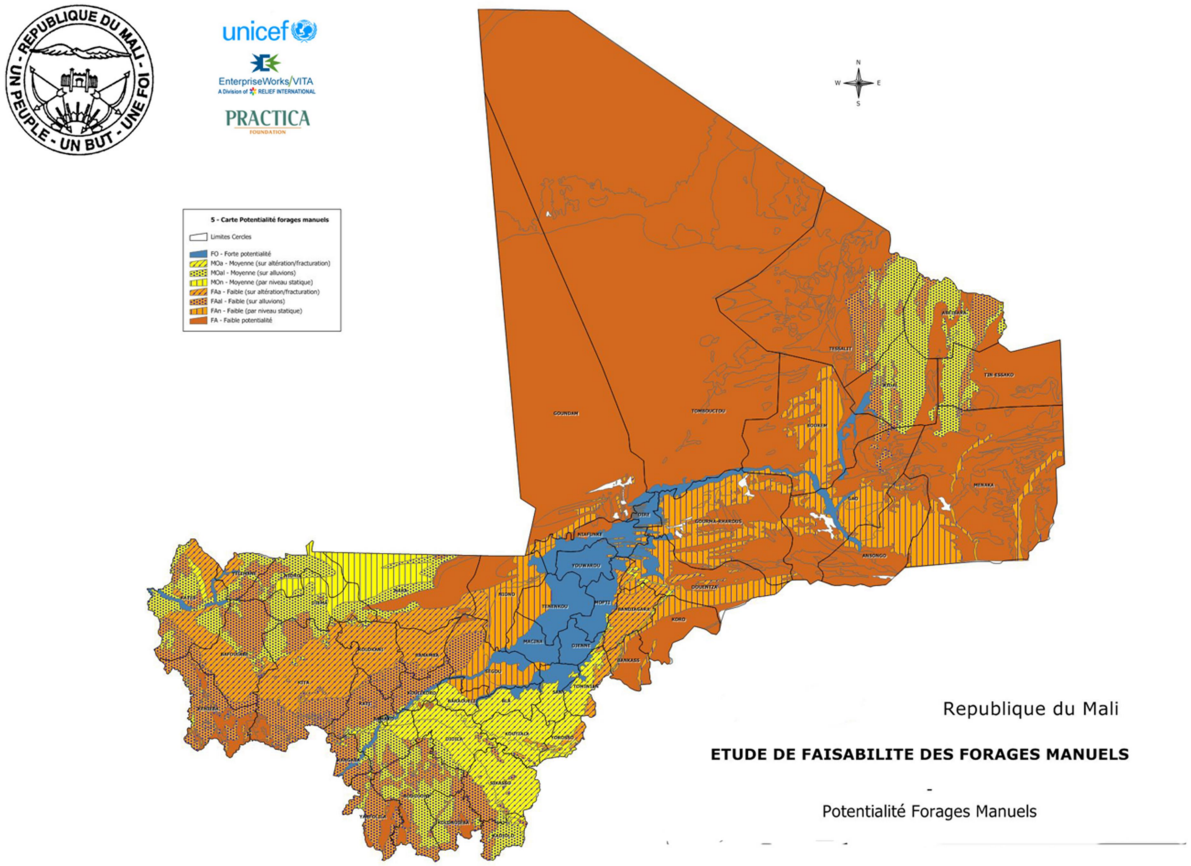
Appendix C: Hydrogeology

1) Geological map of Mali



(source: https://www.researchgate.net/publication/258555891_Carte_Geologique_du_Mali)

2) UN borehole feasibility study



(source: https://www.unicef.org/wash/files/RAPPORT_FORAGES_MANUEL_CORRIGE_%28FINAL%29.pdf)