

**LEAP-AGRI-215**

**Project Title :** *Roles of Agroforestry in sustainable intensification of small farMs and food RAMSESII Security for Socletles in West Africa*

**Project acronym :** *RAMSESII*

**Keywords :** *Food & Income Security - Farmed parklands - Ecological Intensification - Ecosystem services - Socio-bioeconomic modeling*

**Research and innovation foci selection -** *Sustainable intensification of agriculture*

**Duration of the project in months:** 36

**Countries (Institutions):** *Burkina Faso (INERA, WASCAL), France (IRD, Cirad), Netherlands (WUR), Senegal (ISRA)*

**Project Website:** <https://josianeseghieri.wixsite.com/ramsesii>

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Coordinator note :

I am very grateful to all the participants who contributed to this short synthesis, especially during this very uncomfortable situation due to the Covid19 everywhere, from the huge amount of works that were done, especially in WP1 and WP2 as initially planned in the first part of the project and on which WP3 and WP4 depend for the next part (<https://josianeseghieri.wixsite.com/ramsesii/the-work-packages>)..

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A Long term EU-Africa research and innovation Partnership on food and nutrition security and sustainable Agriculture



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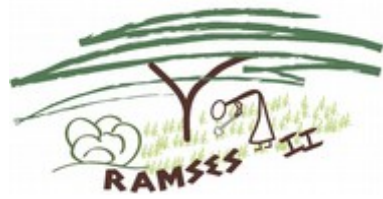
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## Summary

In the current context of West Africa, increasing tree cover while intensifying agriculture production can only be met through innovation. This is despite the real potential of most agroforestry species to contribute to improve rural farm food and economic security. To achieve security, a systemic, multi-disciplinary and multiscale scientific approach combined with a participatory approach with public, civil and private stakeholders was set up. A Theory of Change (ToC) was designed to articulate and monitor the process of scaling to research findings. Whilst during 2019 the majority of data has been collected in WP1 and 2 as providing inputs to the WPs 3 and 4, some data remains outstanding due to special security conditions (jihadism, Covid19) and most of the analysis is yet to be completed.

Since the beginning of the project, remote sensing and inventories work (WP1) to analyse parklands dynamics have been on-going as well as work on demography and agroforestry product value chains. Socio-economic surveys have been initiated. They are either still on-going or already completed, depending on the site and topic (women, park attachment, practices, etc.) but all the data collected remain to be analysed. The agronomic 2019 field campaigns (WP2) working on impacts of trees/shrubs on resources availabilities and yield (and components) of the associated crop have been completed but soil and data analysis have to be done. Modelling is also going on in livelihoods as well as in Surface-Vegetation-Atmosphere Transfers (carbon, water, energy) modelling (WP3). We are waiting for the data analysis and further participative workshops to be able to identify the potential impacts and uses. Main preliminary results achieved are described in the "Progress" part. Theory of Change was updated and adapted to the four studied parklands areas, with monitoring indicators developed (WP4).

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## COVID19 impacts

Experiments in the farmer fields and in stations (intensive automatic measurements) as well as participative workshops and focus groups with farmers and villagers are compromised if lockdown and security conflicts last too long. The Covid19 pandemic since February 2020 have meant that field sites are now inaccessible and the need to teleworking is challenging given the poor internet access in both countries at times. Travelling outback the countries outside big cities is not possible any more, thus to reach sites and villages. That means impossibility to keep student field work on-going, to keep contacts with producers and other stakeholders there, but also to download data from automatic measurements before saturation of the data loggers, etc.

- . Due to COVID in Senegal: Impossible to visit sites and villages. Contacts with producers in each area are therefore not possible. Restrictions (curfew from 8pm, confinement) are due until 4 May. Travel within the country outside Dakar is not possible. The number of positive cases is increasing.
- . Due to COVID in Burkina Faso: No confinement (curfew from 9 p.m. to 4 a.m) but security measures, especially work in alternated shifts in the offices, greatly slow down administrative work while field work is fully stopped, quarantine of most cities and total shutdown of public transport and mail have major impacts on administrative and management work.





## General outline on co-creation processes

### *Stakeholder Engagement :*

- ISRA engaged 8 focus groups and 2 village assemblies around the participative diagnostic and vulnerability analyse assemblies and focus groups ;
- INERA engaged 2 information sessions to present the RamsesII project and know the local "demand" in the villages.

### *Capacity Building :*

- 21 Masters,
- 14 engeneers (10 of whom are French ISTOM ROOT MJE (Young Experts Mission)
- 1 Water & Forest Inspector
- 4 PhD

### *Communication :*

- Kick-off meeting in Ouagadougou (Burkina Faso), 3-8 September 2018; We planned the mid-term RAMSESII workshop in Dakar, by the end of 2020 (November or December) but depending on the health situation.
- Team meeting Montpellier May 2019 ;
- Public project website <<https://josianeseghieri.wixsite.com/ramsesii>>
- Online page on the project were developed on partner institution web sites :
  - x WUR<<https://www.wur.nl/en/project/RAMSES-II-How-to-intensify-agroforestry-sustainably.htm>>
  - x ISRA<<http://isracnrf.sn/?p=1908>>
- WUR, IRD and ISRA produced an information leaflet describing the project, targeting villagers and farmers and usable by all the project participants.
- Basecamp, project management tool to share documents and communicate between partners;
- 6 oral communications, 6 posters at international Conferences ;
- 2 publications (1 published, 1 submitted); The submitted manuscript is about the ToC usefulness between short research project and long development.

*Monitoring & Evaluating of Uptake :* in 2019, in the framework of WP4, task 4.2 "Monitoring-Evaluation", the ToC facilitator (Jan Brouwers, WUR) facilitated two workshops: in Senegal (15-16 April) at the CNRF/ISRA in Dakar, in Burkina (18-19 April) at IRD in Ouagadougou. We are working on four « regional transects » applying a specific ToC while thinking through how scaling can take place in each one. The four update ToCs are showed page 12 (« Progress » part). It is planned to check every year whether the ToC needs to be updated and keep it up to date. This will help to evaluate how lessons learned are taken into account. It is also an opportunity to carry out a participatory reflection together with the project partners.





## General information

The Consortium Agreement is neither finalized nor signed yet. Partners proposed amendments that are not validated yet. All project partners received funding contracts from their national funding party.

The contract with Senegal's national donor, DFRSDT (Ministère enseignement supérieur et de la recherche)-FIRST (Fonds d'Impulsion de la Recherche Scientifique et Technique) and the Senegalese Agronomy Research Institute (ISRA), was signed in June 2019, but the total amount of expected budget is not provided yet. Only several air tickets from Dakar to Ouagadougou (Burkina Faso) were being advanced for the participation of a Senegalese team to the kickoff meeting.

The reasons why partners could not start with their work according to the work plan :

1. funds were released at various dates depending on the partner : the first payment from FONRID to INERA occurred in October 2018, from ANR to IRD it was in November 2018 but in December 2018 to Cirad, as it was from MinEZ to WUR, and from AFD to INERA and WASCAL. Finally, ISRA is still waiting for the DFRSDT-FIRST remaining funds (deducing advances for the travels to the kickoff meeting) are not provided yet to ISRA. That is why none of the project partners could start any field activities in 2018. The aircraft tickets for participations to the kickoff meeting were pre-funded by IRD, CIRAD, WUR, and DFRSDT-FIRST (ISRA).

2. modification of protocols during the kick-off workshop was proposed (see p. 14 « Difference between the project proposal and the effective project implementation »),

3. there were delays in Academic calendars, most of the Burkinabe students did not defend their Msc thesis yet.

4. a lot of time was spent to share among all the participants both understanding and assimilating the specific project functioning (see p. 7 «Fairness & Ethic »).

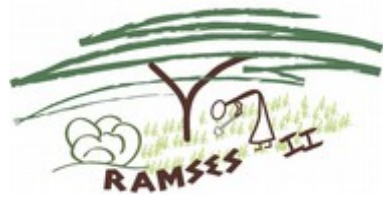
5. a lot of time was spent developing methodologies and survey forms common to Burkina and Senegal,

6. institutional administrative complexities led to the slowness of expenditures proceedings.

7. from the beginning of 2019, Burkina Faso suffered from increasing deadly risks due to terrorist actions by jihadist groups that prevented European partners to go out of the Bobo-Dioulasso and Ouagadougou cities excepted by plane. This is a strong reason why in Burkina Faso, some activities were further delayed and a WUR student could not work there.

8. finally, some participants who were expected to be in charge of the participative workshops and focus groups in farms and villages are missing until now. This is why these workshops have not started yet in Burkina Faso.

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## Fair Partnership Implementation

### Gender

#### A. Gender issues

We are addressing specifically gender issues in the project.

Gender and youth are explicitly and deliberately addressed in the ToC and project activities. Food insecurity is not just a failure of agriculture to produce sufficient food, but the outcome of insufficient income from other sectors, and a failure of development policies. Cash income generated by parklands contributes to increase the resilience of livelihood activities. The intergenerational transmission of knowledge and skills helps to move towards ecological intensification and better use of tree products. Gender and social differentiation are considered because men and women play different roles in rural agricultural and agroforestry production systems, households and communities. Indeed, gender inequalities in rights and access to resources are one of the reasons (although it is not the only one) for the economic underperformance of agriculture in poor countries with significant consequences for their well-being. Innovations may have potential to reduce poverty and unemployment among youths and adults alike (OECD/FAO 2016) of both sexes (World Bank 2008, Ingram et al. 2016). Intended output is the identification of these specific innovations with this potential alike of both sexes in order to insure sustainable food security.

#### B. inclusion of women

We are addressing the inclusion of women in the project.

Our approach takes a disaggregated societal perspective of men, women and young people to take into account age and sex differences among stakeholders and the likely differentiated impacts, costs and benefits of the project. More specifically, through socio-economic and governance surveys, we document in each studied sites, rights and obligations assigned by gender: rights to land, but also trees and their products, access to the means of production, to the labour force and also to the market; all of them are marked by gender inequalities, which are detrimental to women and result in economic inequalities. We also seek to examine gender relationships that are intertwined with other power relationships that manifest themselves according to social class, ethnicity, religion, geographical origin, migrant or indigenous status, wife status, age and life cycle stages. Women are above all not a homogeneous group, power relations are important between them, group solidarity is limited (which can sometimes manifest itself but can also be supplanted by other interests etc.); the combinations are therefore complex and the context is very important to study and take into account in order to disentangle this web. In the participatory approach, we integrate constraints and adapt methods for focus groups with women in villages where they are frequently social inferiors with little or no place in the public sphere (institutions and decision-making spheres).

In the project team we also aim to have a gender balance, and particularly in the selection of MSc and PhD students, we pay attention to having sufficient representation of women, who are traditionally disadvantaged in accessing higher education in Burkina Faso and Senegal. Finally, the project organisation itself is



also gender sensitive, with more women than men in charge of the co-coordination of the WPs, and the four countries coordinators being women.

### **C. Women addressed with the project output**

We are addressing women with the project output.

Outputs will be addressed to local stakeholders through workshops (the main ones were not held yet) where the research findings will be fed back and where small-scale producers, women as men, and women's groups of producers/processors (as for shea butter in Burkina Faso) will be present as will be young stakeholders, in order to contribute to co-built innovations at farm and territory scales (WP3 innovation platform).

### **Fairness & Ethic**

We arranged our project, so that all the partners are involved in a shared and equitable way, in relation to the means and funding they got.

The functioning of the RAMSES project is based on the North-South co-supervision of most of the students and project activities. The European partners, the less endowed in budget, ensure their functioning and the one of a part of the students. The African partners, who are more endowed, are expected to cover the running costs of the joint field activities: gratuities and functioning of most of the students.

Also all the Work Packages of the project are co-coordinated by a European and an African partner. The European co-coordinators ensure the similarity between the two countries of approaches, disciplinary methodologies and criteria of the site sampling along the four transects (two in Senega, two in Burkina) as well as the optimal geographical overlap of the different disciplinary activities according to nested scales. The African coordinators are expected to ensure in their country the implementation and coordination of the activities, maintaining participatory approach and contact with partners, NGOs and network.

Thus, preliminary surveys were carried out in each country along each transect by teams bringing together the different disciplines of the project as well as European and African participants. They made it possible to identify village territories that take into account landscape heterogeneity, ethnic and cultural diversity, the organisational dynamics of communities, the diversity of practices and productions (value chains, etc.). These village territories have been the subject of in-depth investigation by human and social sciences (socio-anthropology, economy, geography). Within these territories, parks were sampled for the quantification of the processes underlying the eco-, socio- and agro-system services provided by the trees. The selection of parks for their biophysical, ecological and agronomic monitoring was based on a gradient of tree density and diversity and a typology of agronomical practices and production systems assumed to be locally predominant.

However, we have several suggestions for improving the partnership's equity and fairness. The acknowledgement of this massive task for the co-coordinators is expected to be, at all stages of the work, the rigorous set up of the transversal methodology, the full sharing of raw data within a common data base and of their analyses, and finally the co-publication of the results. This is more or less the case in RamsesII despite some disappointments due to the solid habits of individualism and



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competitive evaluation of researchers from both continents, which are not conducive to this collective state of mind.

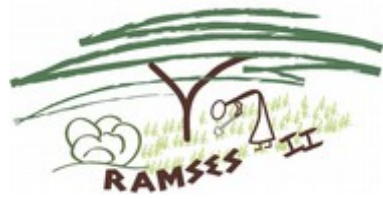
To encourage mixed (North-South) teams to publish together may contribute to buffer this trend. Numerous joint missions and meetings also helped to foster a sense of team work and most importantly, allow synergies between WPs and joint understanding of the multidisciplinary aspects of the project.

However, differences between institutional and project logics and logistic also need to be overcome. The distribution of the project funds between different institutions does not facilitate to gather activities around the project vision and aims. The budget constraints and management are not the same between institutions, and the institutional priorities certainly lead to a logic of equity and justice within a given institution, but not always to that of the project. Numerous coordination and regulation meetings are not always and immediately followed by an efficient and appropriate execution.

Finally, the relationships between the research institutes and the organisations (NGOs and producer groups) that should participate to the innovation platforms are questionable. The lack of finance for NGOs time (only their costs are financed), and their dependence from the European research institutes is a major and unfair, prohibiting them being able to effectively contribute to the project. If an efficient participatory research is expected, a better autonomy of the platforms set up has to be ensured by funding the actors of the project outcomes and impacts implementation and monitoring.

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## Progress

A widely held assumption is that intensifying agroforestry will lead to sustainable increase in production, societal resilience and food security, urgently needed in the current context of changes in markets, climate and demography. In the current context of West Africa, increasing tree cover while intensifying agriculture production can only be met through innovation. To achieve it, a systemic, multi-disciplinary and multiscales scientific approach combined to a participatory approach with public, civil and private stakeholders was set up. A Theory of Change (ToC) was designed to articulate the process of scaling to research findings. Activities in the field started all along 2019, mainly for WP1 and 2 as providing inputs to the WP3 and 4. Most of the works was done with African students co-supervised by African and European partners (see p. 24 « List of the students »). All are postponed or slowed down now because of the Covid19 pandemic health measures. We developed and use the internet platform Basecamp 3 to share data and documents and communicate.

**W1. Parkland dynamics drivers** (co-leaders : Droy I.-IRD & Dieng M.-ISRA) ;  
**Outputs:** 12 master, 4 engineer & 1 inspector thesis + 10 French engineer students as "ROOTS Mission Jeunes Experts" (ISTOM thesis defended).

### ***Tsk 1.1. At landscape scale***

We combined various resolutions satellite images and inventories to analyse the current structure and dynamics of the parklands. Population densities within the project villages are found often much above the threshold of 50 inhabitants/km<sup>2</sup> that is known to insure balanced with good health parklands. The current monetarisation of the rural economy and powerful migratory flows raises questions about even the usefulness of agroforestry in these production systems.

At the same time, more than 40 Non Timber Forest Products (NTFPs) were identified. Several have a higher growth potential to support economy, local employment and rural livelihoods. They are however largely neglected and poorly regulated by governments, and face drought issues, changes in agriculture practices, overgrazed, low of level of adding value and low skills of many collectors and retailers, and over-exploitation by numerous actors precisely because they play multiple roles in food and nutrition security.

### ***Tsk 1.2. At territory scale***

On the Koumbia-Dano (Burkina) transect, five development projects were identified as potentially able to modify the parkland tree cover: teak plantations since the 1970s; introduction of harnessed cultivation; development of lowlands; AVV developments; support for motorization in the Koumbia-Gombeledougou region. First interviews in Senegal showed a strong contradiction between acknowledgement of *F. albida* (Fa) utility and the absence of care on its regeneration.

### ***Tsk 1.3. At farm scale***

Intensity of tree pruning, tree size, tree stand density, soil organic management, including low or no chemical fertilizer input, were found as being the most discriminant management practices between Fa parklands around Niakhar



(Senegal). In Burkina around Dano, tree density and diversity, tree pruning and Farmer Managed Natural Regeneration (FMNR) vary according to site and species. A higher shea fruit production than in natural formation was observed in fallow and in yards (farmer care, fertilization, ploughing practices, etc.), and the young seedlings were observed to be removed even in fallows by a specific ethnic group. In the south-central region of Burkina Faso, FMNR is adopted at 65% but might not alone be able to restore multifunctional and resilient ecosystems. FMNR is dominated by drought tolerant shrubs favoured by high land use intensity, to the detriment of large trees that characterize the established population. Farmers who own their plot are more likely to adopt it but tend to have a lower species diversity, and poor communities' practice more intense FMNR. Also, the greater the distance to market, the higher the density but the lower the species diversity.

**WP2. Socio-ecosystem services** (co-leaders : Clermont-Dauphin C.-IRD & Coulibaly P.-INERA) ; **Outputs:** 11 master & !:1 PhD thesis.

### ***Tsk 2.1. Multipurpose provisioning services***

The annual *Piliostigma* shrub production reached a plateau in 2018 (4-6t/ha/year for 500-2000 shrubs/ha densities). Under Fa crown, up to five times positive effects on millet yield and yield components was estimated than at a distance of five crown radii from the trunk, and the reverse for roots production. A novel approach by drone provided a distance of influence of Fa on crops production of 17 m and a crop yield estimation at parkland scale close to the one measured on the ground. At the same time, over 4 years, *Piliostigma* intercropping alone do not increase sorghum yield since it allows the stabilization of soil C content but not N and P. Negative effect of shea tree proximity was observed on sorghum growth and grain yields confirming thus the literature.

### ***Tsk 2.2. Supporting and regulating services provided by the woody cover***

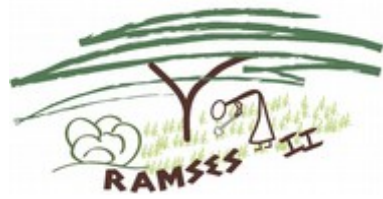
First observations (analysis in process) made according to the distance from the trees/shrubs in all the parklands show that most important millet pests were armyworms (at young stages), head miner moths, fungal diseases (on millet ears), and *Striga hermontica*. Significant lower attacks of armyworms were recorded on millet under the trees than outside. Higher available water under Fa canopy and Fa low water uptake versus its already significant beneficial effect on millet yield supports the interest to increase Fa density.

### ***Tsk 2.3. Services spatialization***

A 2019 land cover map of the Niakhar regional transect (Senegal) will be produced from a time series of 28 satellite images and a field campaign conducted at the end of the cropping season. In Burkina, the maps available for various parklands (dense/sparse /degraded stands) will be converted into maps of SSE using proxies.

**WP3. Intensification scenarios co-building** (co-leaders : Sanfo S.-WASCAL & Ingram V.-WUR) ; **Outputs:** 2 PhD students.

### ***Tsk 3.1. Bio-Economic modelling at farm scale***



A literature review and review of the data required for the livelihood modelling was completed. A Soil Vegetation Atmosphere Transfert model (carbon, energy, water) has been calibrated for the open-field situation, and partitioning of water fluxes between trees and understorey estimated.

***Tsk 3.2. A participative livelihood approach at farm scale***

It is too early at this stage, farm participative workshops did not start yet.

***Tsk 3.3. Participatory approach at territory scale***

See p. 19 “Dissemination Actions” part (8 focus groups in Senegal and 9 « Awareness/Information/Discussion sessions » in the two countries).

**WP4. Design and facilitation of scaling ISMSI** (co-leaders : Bastide B.-INERA & Brouwers J.-WUR) ; **Outputs:** 1 PhD student.

***Tsk 4.1 Evaluation of a “cluster” diffusion method of shea tree regeneration techniques***

In view of the academic delay and Covid19, a three-month "pre-thesis" internship allowed the Burkinabe PhD student to start activities while waiting to be able to insure the defense of his Msc thesis.

***Tsk 4.2 Monitoring & evaluation framework***

The design and facilitation of scaling was identified, agreeing on mechanisms how research results are anticipated to contribute to development results, and capacity strengthening needed. A set of indicators were agreed upon as well as information sources identified. All the works conducted during 2019 contribute to the project expected outputs. Only after the analysis of the data will be done, we will be able to know the true potential of all the current studies.

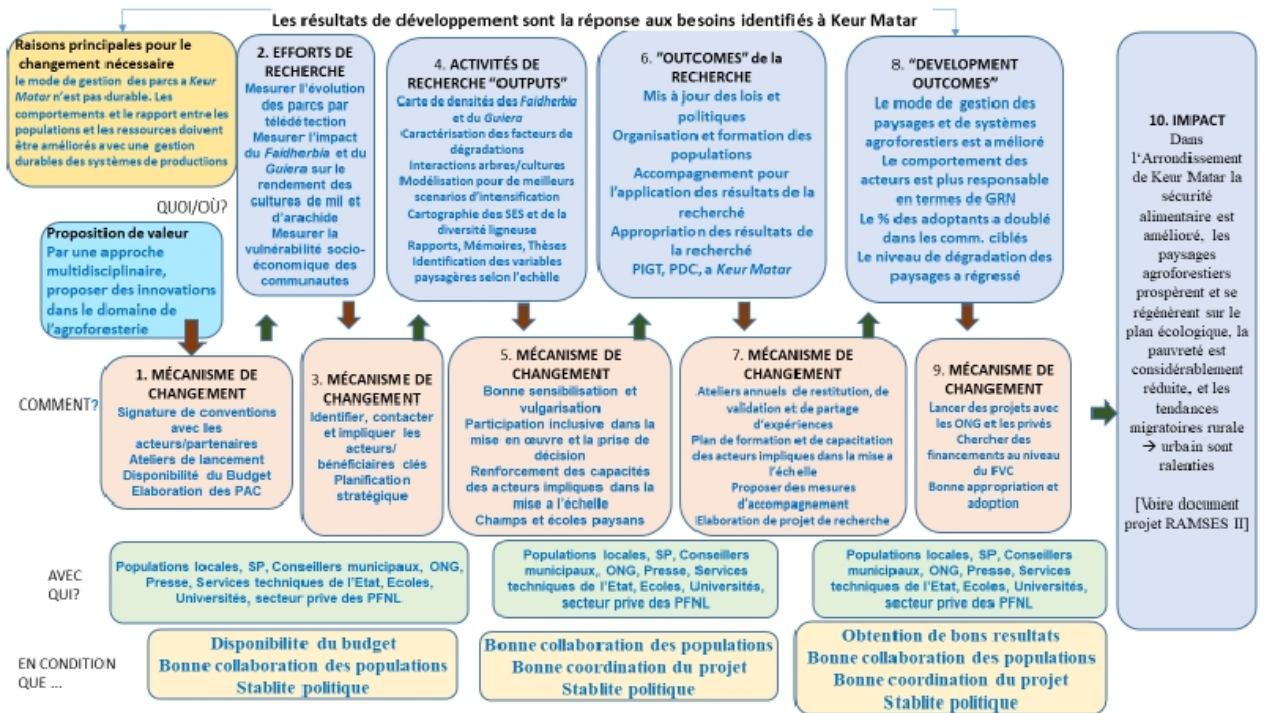
**Conclusion**

Fully relevant to the Leap-Agri priority, the RamsesII multi-institutional research consortium documents practical and realistic agroforestry-based responses to food insecurity challenges. Its functioning fully contributes to a fair partnership between African and European research centres while trying to provide development pathway.



**Revised Theory of Change and Impact Pathway**

**ToC 2019 of the transect Keur-Matar (Thiès) in Senegal**

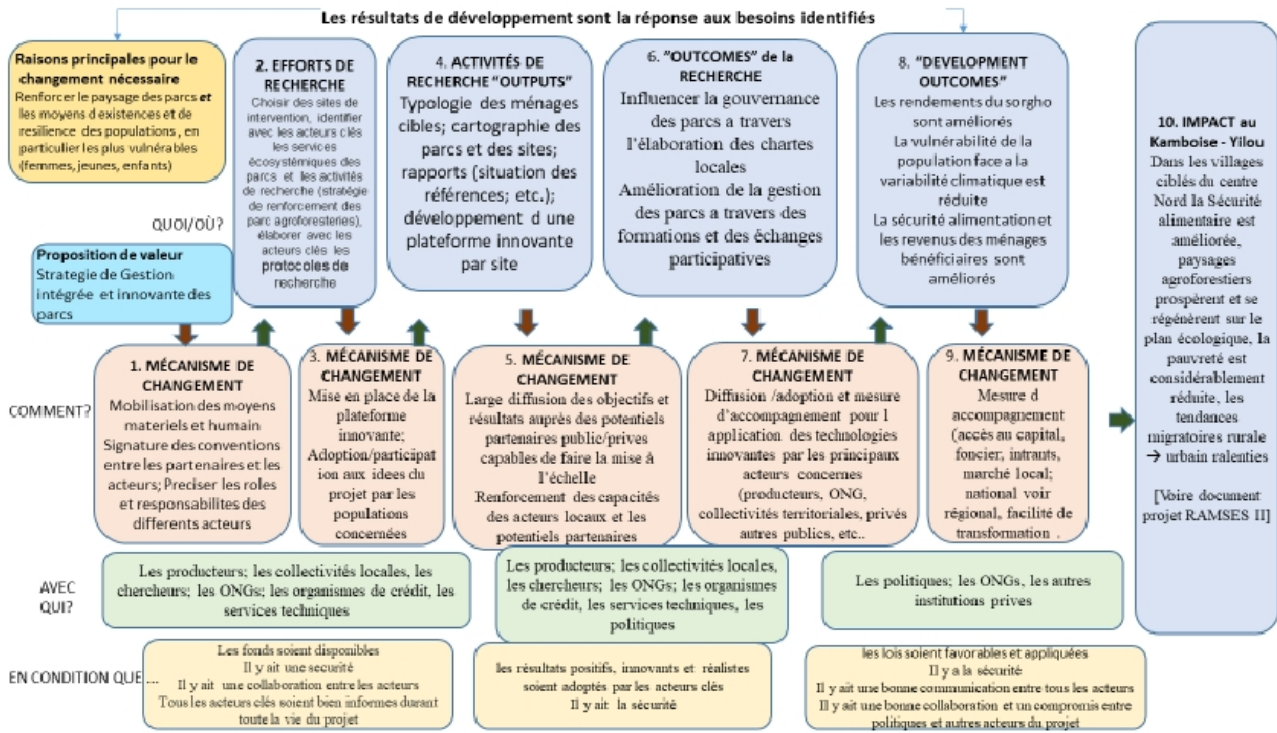


**ToC 2019 of the transect Niakhar in Senegal**

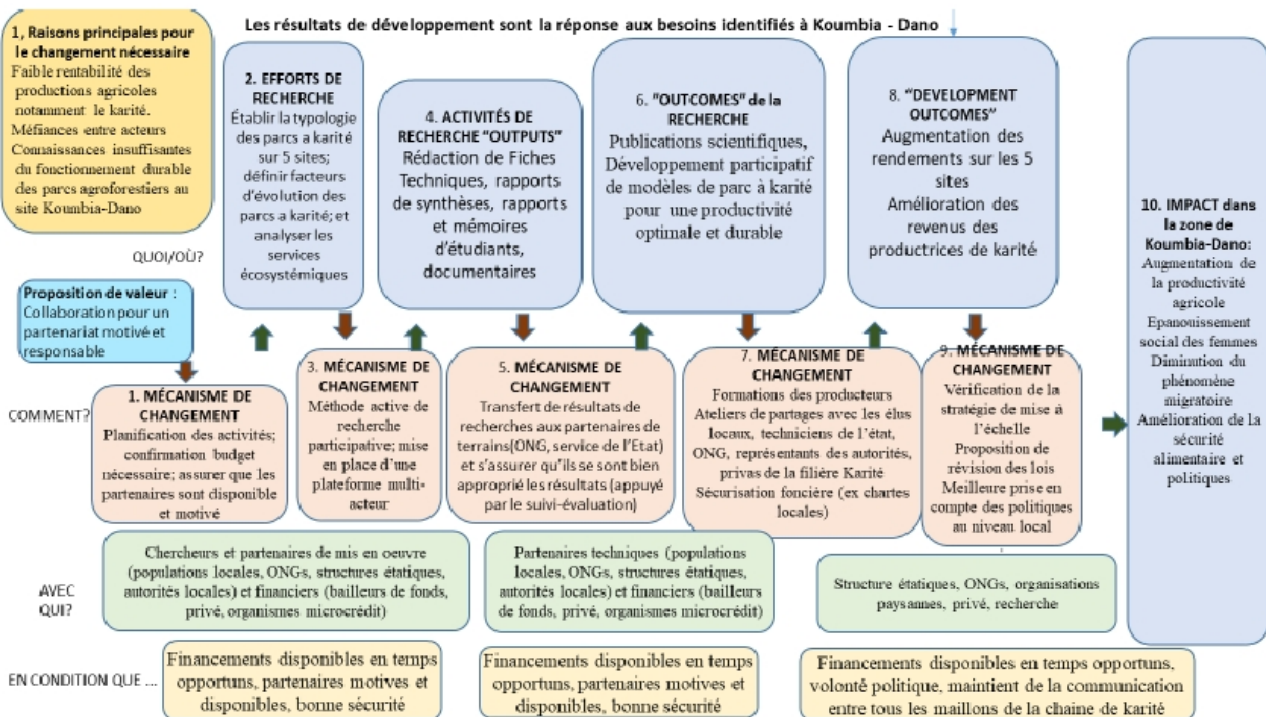


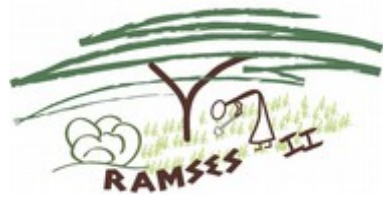


### Toc 2019 of the transect Kamboinsé-Yilou in Burkina Faso



### ToC 2019 of the transect Koumbia-Dano in Burkina Faso





### **Successes and challenges, and lessons learned**

It is far too early to have a view on successes and challenges in research uptake as well as co-creation processes. At the moment, there is no application of RAMSESII research because we have no results yet but only raw data after only one field campaign. For the co-creation process, it is expected from the operation of the platforms which are barely starting to take place, and only in Senegal.

As coordinator, the most important lessons learned for the moment, is that, given his objectives, the approach chosen by the Leap-Agri consortium does not appear as being the most relevant. Indeed, how the Leap-Agri consortium does expect to obtain, from this short term research, scientific results that are precisely tailored to stakeholders' priorities and needs even before knowing the later? Also, the link between research and development does not have time to be made in three years, even more when forest low-growth plants are concerned and direct finance for NGOs, supposed to implement research outputs and monitor impacts after the project, is lacking (see part « Fairness & Ethic »). Moreover, user-induced and community-based innovations are eminently slow and rather rare processes which require an active and balanced civil society, i.e., far from the poorest African rural opportunistic societies whose priority is to survive. In the absence of these conditions, projects are obliged to disseminate research outputs that are already known - consequently they are not proper "innovations" - and more often without the required distance.

### **Difference between the project proposal and the effective project implementation**

There was an overall delay of activities compared to the initial schedule because of the eight points listed p.5 in « General information » part).

Furthermore, at the kickoff meeting we realized that resources for agronomy data collection and modelling were under-estimated in spite of being at a central place in the project. Consequently, we re-allocated 40 K€ from AFD (20 from Senegal, 20 from Burkina budgets) initially planned to buy ecophysiology devices toward two PhD in modelling : one in socio-economy supervised by WASCAL (with INERA funds from AFD), the other in biophysic supervised by Cirad and ISRA (with ISRA funds from AFD), in addition to four additional MSc grants in agronomy, i.e., one in each country.

This change did not lead to a deep re-structuration or re-organization of the project. Ecophysiology was maintained only at Sob (Senegal) because it makes full sense on this site of intensive biophysical measurements where it is combined to the flow station (eddy-covariance funded by Cirad) on a *F. albida* parkland.

During 2019, Burkina suffered from increasing deadly risks due to terrorist actions by jihadist groups. This situation made, e.g., the regional transect Kamboinsé-Yilou inaccessible since the end of October 2019, for Burkinabe colleagues as well. This is a reason why in Burkina Faso, some activities were further delayed. By February 2020, the Covid-19 led in the four countries involved in the RamsesII project to the full cessation of the field activities and drastically slowed down the administrative and cooperation ones (see p. 3 « Covid19 » part).



**The reasons why an extension of the project duration is needed**

Given the arguments set out above, also because the consequences of the extension the Covid19 everywhere (see p.3 box on *COVID19 Impacts*) but also of the terrorism in Burkina Faso since mid-2019 remain totally unpredictable to date, we request a non-cost, time only, extension of the project.

Indeed, for the moment, it is not known how the COVID situation will develop and there is a lot of uncertainty also if COVID will exacerbate the pre-existing conflicts and security in Burkina Faso.

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## Further Topics

### **How the RAMSESII project refers to the National Development Plans (NDP) of the countries involved in your research : Burkina Faso, Senegal, The Netherlands, France.**

RamsesII refers to NDP in the countries involved in the project through the missions and activities of the research institutions composing its consortium.

Senegal has implemented major programs to improve, strengthen and modernize the agricultural production base through the policies defined in the Plan Senegal Emergent (PSE), in its PRACAS component (Program for Accelerating the pace of Senegalese Agriculture) to which ISRA researches answer.

The INERA researches (one of the four national research institutes) develops its researches in accordance with Burkina Faso's National Development Plans.

WASCAL refers to the National Development plans in Burkina Faso and Senegal by reviewing the national plans, collaborating with national key stakeholders (Municipalities, Ministries, farmers organisations, research institutes, NGOs), redirecting research questions to meet key stakeholder needs including decision makers.

The French National Strategy for Sustainable Development (SNDD) 2015-2020 aims to strengthen pedagogy and support for stakeholders to help them structure and amplify their approaches in favour of ecological transition, at national, European and international level with the axis 9 "Promoting sustainable development".

Wageningen UR has been developing a new Sahel Strategy, based on the new Netherlands policy on the Sahel "#Investir pour prévenir". This policy foresees new investments to reduce poverty, promote sustainable inclusive growth and prevent further instability and conflicts.

### **Policy relevance that is embedded in the RAMSESII project research**

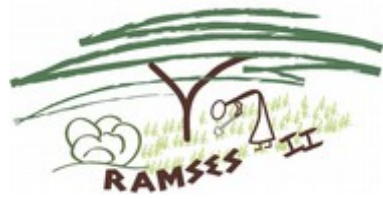
For ISRA, the research carried out within the framework of RAMSES II fits perfectly into Senegal's environmental policy as set out in axis 4 of the PES (sustainable reforestation of the national territory in conjunction with local authorities; creation of a national reforestation agency) but also with the adoption of the National Strategic Investment Framework for Sustainable Land Management (CNIS/GDT).

For INERA, Burkina Faso's national development plans are based on two fundamental aspects: Sustainable Development and the Fight against food insecurity, to which is added the gender aspect. This is where INERA studies in RAMSESII are relevant.

WASCAL research studies in RAMSESII meet households and other stakeholders needs (household resilience, income generation, livelihood, food security), making them sound to policy. The livelihood model they develop aims at providing innovative scenarios of parklands intensification that are expected to be suited to farmer's organisations for their resilience and food security.

French research for development is based on 17 Sustainable Development Goals (SDG) among which the RAMSESII project mainly answers to the 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture, 5: Achieve gender equality, and 15: Protect, restore and promote sustainable use of terrestrial ecosystems, through the goal 17: "Revitalize the global partnership for sustainable development".





Two of the Dutch focuses to which the RAMSESII project contributes are 1) sustainable trade and investment 2) food security, agricultural development, water and renewable energy.

### **Way of the RAMSESII project's results will be communicated to policy makers and which policy makers**

The research results will be communicated through national institutions and bodies, and usual international tools of research valorisation : conferences, seminars, publications, workshops of National Research Centers that are expected to be forwarded to Agricultural, Breeding, Waters and Forests and environment Ministries. We wish our results will be communicated also through agricultural fairs, Multistakeholder Platforms (MSPs) local and endogenous media, social media to decision makers: Regional and provincial agricultural directorates, agricultural extension agents, NGOs and farmers organisations, etc.

### **Interactions developed with other LEAP-Agri projects**

An overlap does exist between the RAMSESII and Wagrinnova projects through sharing the Dano site (regional transect Koumbia-Dano for RAMSESII), and the IRD team involved from the Joint Research Unit GRED. Thanks to the two projects, innovations both in (mainly shea) parklands and in water-managed agricultural systems will be documented in Burkina Faso around Dano.

There is no other concrete interactions with other LEAP-Agri projects, although it may certainly have other possible complementary aims and activities.

### **Interactions develop with other "Non LEAP-Agri" projects related to similar topics in the countries involved**

In the framework of the implementation of the RAMSES II project, synergies are being established by ISRA in Senegal with other projects working in the field of the greening of the park, in particular to combat the degradation of the environment and plant cover. Among these projects, we can mention, among others, the project on "Communities Greening the Sahel (CRS/IED)", the "Regreening" (World Vision) project.

The INERA team of the RAMSES II project is involved in other similar projects in Burkina. Interaction with other action-research projects is also developed through collaboration with farmers' organizations (shea producer networks, NGOs) involved in the RAMSES II project.

WASCAL develops interactions with other projects as well by i) reviewing the results of existing similar research to better design their research questions, ii) building up on similar research networks, iii) discussing and collaborating with researchers from others research institutions working on similar research questions.

The French teams in RamsesII are also involved in several other projects in common sites in Senegal and Burkina Faso: DSCATT "Soil carbon sequestration in farming systems" (2019-2023); <https://dscatt.net/>); H2020 "SustainSahel Synergistic use and protection of natural resources for rural livelihoods through systematic integration of crops, shrubs, and livestock in the Sahel" (2021-2024); these two projects are the most close to the Ramses scope, (among others).



**The collaboration with your funding agencies**

The collaboration with all the funding agencies is good and rather supple, based on a lot of very helpful communications, and since all the funded institutions provided timely report of their research activities and financial report.

The only regrettable fact remains the non-availability of remaining funds from the national donor (DFRSDT-FIRST) in Senegal, despite the convention has been signed.

**The collaboration with the LEAP-Agri consortium as a whole**

As coordinator, and only engaging my personal opinion here, I find the meaning and objectives of Leap-Agri's requests sometimes difficult to understand, and a bit out of step with our main scientific concerns. However, I presume that they are interested in how the projects are proceeding and honestly question whether the format they chose is effective. Indeed, after only one year, de facto there cannot have yet many outcomes or impacts. But even after only three years of research, this ambition to get visible impacts appears an utopian vision to me since development occurs de facto on the long term, even more with forest plants. See part p.14 "Successes and challenges, and lessons learned"), and the manuscript Seghieri et al. "Research and development dilemmas in scaling innovation, a case study from the Leap-Agri RAMSES II project" submitted for publication to the journal Agroforestry Systems, special issue on "Scaling up of agroforestry Innovations: Enhancing food, nutrition and income security".

For the research teams working in the field, they are focusing, as large and dispersed consortium, on co-production of a common multidisciplinary data base from common disciplinary methodologies. Without Leap-Agri presence (like B. Mallet last May in Montpellier to whom we are very grateful), this collaboration is concretely reduced to the messages from Leap-Agri that are forwarded by coordinators to the teams.

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## Dissemination Actions

### Scientific publications (2)

Seghieri J., Brouwers J., Bidou J-E., Ingram V., Droy I., Bastide B., Sanogo D. (submitted 30 March 2020, very good chance of being accepted for publication). Research and development dilemmas in scaling innovation, a case study from the Leap-Agri RAMSES II project. Agroforestry Systems Special Issue on "Scaling up of agroforestry Innovations: Enhancing food, nutrition and income security".

Roupsard O., Audeber A., Ndour A.P., Clermont-Dauphin C., Agbohessou Y., Sanou J., Koala J., Faye E. , Sambakhe D., Jourdan C., le Maire G., Tall L., Sanogo D., Seghieri J. , Cournac L., Leroux L. 2020. How far does the tree affect the crop in agroforestry? New spatial analysis methods in a *Faidherbia* parkland. Agriculture, Ecosystems and Environment (IF 3.954) 296 : 106928. DOI 10.1016/j.agee.2020.106928.

### Conference/ seminars / workshops

#### Oral communications (6)

Roupsard O. 2020. More C uptake during the dry season? The case of a semi-arid agro-silvo-pastoral ecosystem dominated by *Faidherbia albida*, a tree with reverse phenology (Senegal). **Regular talk**, EGU, congress, Session BG3.30: « Tropical landscapes and peatlands: Biogeochemistry, ecohydrology and land use impacts » 3-8 May 2020. Austria, Vienna.

Roupsard O. 2019 . *Faidherbia-Flux*, A new long-term Collaborative Observatory on GHG fluxes and ecosystem services in a semi-arid agro-silvo-pastoral ecosystem. Side-Event Sustainable Intensification. **Invited talk**, Conference Intensification Durable-2019 ; « Séquestration Continentale du Carbone au Sahel Agroécologie, Climat et Sociétés : rencontre pour promouvoir une interdisciplinarité et intersectorialité effective en appui aux Politiques Publiques » 7 Octobre 2019. Dakar, Sénégal. PSIP Séquestration continentale du Carbone – IRD.

Jourdan C. 2019. Effect of coppice management of shrubs associated with cereals on their root dynamics features in dry Western Africa". **Keynote talk**, 4th World Congress on Agroforestry, session L23 "Roots issues in agroforestry", 20-22 May 2019, Montpellier, France. *In* : Dupraz Christian (ed.), Gosme Marie (ed.), Lawson Gerry (ed.), book of abstracts p 801.

Roupsard O. 2019. *Faidherbia-Flux*": adapting crops to climate changes in a semi-arid agro-silvo-pastoral open observatory (Senegal)". **Regular talk**, 4th World Congress on Agroforestry, session L2 on "Agroforestry and adaptation to climate change", 20-22 May 2019, Montpellier, France. *In* :Dupraz Christian (ed.), Gosme Marie (ed.), Lawson Gerry (ed.), book of abstracts p 72.

Seghieri J. 2019. Roles of Agroforestry in sustainable intensification of small farMs and food



SEcurity for Societies in West Africa (RamsesII)". **Regular talk**, 4th World Congress on Agroforestry, session L8 on "Scaling up of agroforestry innovations", 20-22 May 2019, Montpellier, France. *In* : Dupraz Christian (ed.), Gosme Marie (ed.), Lawson Gerry (ed.), book of abstracts p 253.

Roupsard O. 2018. A new long-term Collaborative Observatory on GHG fluxes and ecosystem services in a semi-arid agro-silvo-pastoral ecosystem (groundnut basin in Niakhar/Sob, Senegal). **Regular talk** AMMA CATCH Observatories of the Critical Zone in Africa: Current Issues and Findings, 12-14 November 2018 ; Niamey, Niger.

### **Posters (6)**

Bastide B. **2019**. Preservation of shea resource through the transfer of shea plant regeneration techniques to the female producers" at the 4th World Congress on Agroforestry,, session L8 on "Scaling up of agroforestry innovations", 20-22 May 2019, Montpellier, France. *In* : Dupraz Christian (ed.), Gosme Marie (ed.), Lawson Gerry (ed.), book of abstracts p 260.

Dao M. C. E. **2019**. Climate change and shea tree: women's perceptions and impact on flowering and fruiting in Burkina Faso", 4th World Congress on Agroforestry France, session L6 "Social issues in Agroforestry systems (gender, migration)", 20-22 May 2019, Montpellier, France. *In*: Dupraz Christian (ed.), Gosme Marie (ed.), Lawson Gerry (ed.), book of abstracts p. 226.

Douzet J-M. **2019**. Long-term Piliostigma reticulatum intercropping in the Sahel: Impact of the density of shrub on sorghum yield" at the 4th World Congress on Agroforestry, session L10 "Agroforestry in practice", 20-22 May 2019, Montpellier, France. *In* : Dupraz Christian (ed.), Gosme Marie (ed.), Lawson Gerry (ed.), book of abstract; 124.

Leroux L. **2019**. Impacts of FMNR on the agricultural performance of smallholder farming systems at landscape scale in Senegal ". 4th World Congress on Agroforestry, session L10 "Agroforestry in practice", 20-22 May 2019, Montpellier, France. *In* : Dupraz Christian (ed.), Gosme Marie (ed.), Lawson Gerry (ed.), book of abstracts p. 260.

Ouoba Y. H. **2019**. Comparison of five shea tree (Vitellaria paradoxa C. F. Gaertn.) regeneration techniques in Burkina Faso" at the 4th World Congress on Agroforestry, session L10 "Agroforestry in practice", 20-22 May 2019, Montpellier, France. *In* : Dupraz Christian (ed.), Gosme Marie (ed.), Lawson Gerry (ed.). Book of abstracts, p. 384.

Roupsard O. **2019**. Faidherbia-Flux", an open observatory for GHG balance and C stocks in a semi-arid agro-silvo-pastoral system (Senegal) " at the 4th World Congress on Agroforestry, session L1 " Mitigating climate change with agroforestry", 20-22 May 2019, Montpellier, France. *In* : Dupraz Christian (ed.), Gosme Marie (ed.), Lawson Gerry (ed.), book of abstracts p 44.

### **Diffusion on web sites (3)**



Sanogo D. (ISRA). **2018**. Informations on RAMSESII project on the ISRA-CNRF partner institution web site: <<http://isracnrf.sn/?p=1908>> since octobre 2018.

Ingram V. (WUR). **2019**. Informations on RAMSESII project on the WUR partner institution web site: <<https://www.wur.nl/en/project/RAMSES-II-How-to-intensify-agroforestry-sustainably.htm>> since January 2019.

Seghieri J. (IRD). **2019**. Public RAMSESII web site. The link is in the coordinator mail signature for a large diffusion <<https://josianeseghieri.wixsite.com/ramsesii>> since August 2019.

### Focus groups (8)

Sanogo D., Diop M. Ba H.S. **2020**. **Focus group with men** around vulnerability analyse at Diöhine within the Niakhar regional transect (Senegal), 22-23 February 2020 ; Languages : Wolof / Sereer ; Audience : Farmers (13) ; Researchers (1) ; Government actors (2).

Sanogo D., Diop M. **2020**. **Focus group with women** around vulnerability analyse at Diöhine, within the Niakhar regional transect (Senegal), 22-23 February 2020 ; Languages : Wolof / Sereer ; Audience : Farmers (9) ; Researchers (1) ; Government actors (2).

Sanogo D., Diop M. **2020** . **Focus group with women** around vulnerability analyse at Thiéneba-Thiès within the Thiès regional transect (Senegal), 20-21 February 2020 ; Language : Wolof ; Audience : Farmers (22) ; Researchers (2) ; Government actors (2).

Sanogo D. , Diop M., Ba H.S. **2020**. **Focus group with men** around vulnerability analyse at Thiénaba-Thiès within the Thiès regional transect (Senegal), 19 February 2020 ; Language Wolof ; Audience : Farmers (24) ; Researchers (1) ; Government actors (2).

Sanogo D., Diop M., Ba H.S. **2020**. **Focus group with men** around vulnerability analyse at Sob within the Niakhar regional transect (Senegal) ;13-14 January 2020 ; Languages Wolof / Sereer ; Audience : Farmers (18), Researchers (3), Government actors (4).

Sanogo D., Diop M., Ba H.S. **2020**. **Focus group with women** around vulnerability analyse at Sob within the Niakhar regional transect (Senegal), 13-14 January 2020. Languages : Wolof / Sereer ; Audience : Farmers (21) ; Researchers (2) ; Government actors (4).

Sanogo D., Diop M., Ba H.S. **2020**. **Focus group with men** around vulnerability analyse at Pouday within the Niakhar regional transect (Senegal), 10-11 January 2020. Languages Wolof / Sereer ; Audience : Farmers (14) ; Researchers (1) ; Government actors (4).



Sanogo D., Diop M. **2020. Focus group with women** around vulnerability analyse at Pouday within the Niakhar regional transect (Senegal), 10-11 January 2020. Languages : Wolof / Sereer ; Audience : Farmers (12) ; Researchers (2) ; Government actors (1).

### **Awareness/Information/Discussion sessions (9)**

Sanogo D., Diop M. **2020. Village assembly** around the participative diagnostic and vulnerability analyse at Thiénaba - Thiès (Senegal), 19 February 2020 ; Language : Wolof ; Audience : Farmers (46, half women, half men) ; Researchers (2) ; Government actors (4).

Sanogo D., Diop M. **2020. Village assembly** around the participative diagnostic and vulnerability analyse at Niakhar (Senegal), 09 January 2020 ; Languages :Wolof / Sereer ; Audience :farmers (72, 34 men & 38 women), Researchers (3) , Government actors (7)

Seghieri J., Sanogo D. **2019. Restitution workshop** by the ten ISTOM students after one month in the field, working on 1) functioning and mapping from the village actors' saying; 2) land governance; 3) value chain of the main non-timber forest products. The students worked in Dihine, Tukar and Poudaye within the Niakhar regional transect, and Thilla Ounté and Thilla Boubou within the Keur Matar (Thiès) regional transect. 12 août 2019 IRD-ISRA Dakar-BelAir ; Languages : French ; Audience : Researchers (20), NGOs (1)

Seghieri J., Sanogo D., Ingram V., Droy I. **2019. Information leaflet** on the RamsesII project targeting villagers and farmers, 30th July 2019 ; Languages : French translated into local languages by local translators ; Audience : Farmers ; Private sector, NGOs, Government actors.

Seghieri J., Sanogo D., Diop M. **2019. Restitution workshop** at Dihine village by the three French students from the ISTOM (<http://www.istom.fr/1.cfm?p=802-accueil-istom-ingenieur-agro-developpement-international-humanitaire>) in 4th year of studies in Agronomy for Development after one month of investigations on the perception by its inhabitants of the functioning of the village in their environment and the other spaces to which it is connected, in Dihine, Toukar and Poudaye villages within the Niakhar regional transect. 10 July 2019 ; Languages : French translated into Sereer language ; Audience : Farmers (25, half men, half women), Researchers (3), students (6 from the RamsesII project, Senegaleese and French)

Brouwers J. **2019. Training workshop** on the theories of change (toc) and updating of the monitoring-evaluation system of the indicators of the RAMSES II project in Burkina Faso. 18-19 April 2019. Language : French ; Audience : Researchers (6), NGOs (2), Government actors (3).

Brouwers J. **2019. Training workshop** on the theories of change (toc) and updating of the monitoring-evaluation system of the indicators of the RAMSES II project in Senegal, 15-16 Avril 2019. Languages : French ; Audience : Researchers (8).



EUROPEAN UNION

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Bastide B. **2019. Discussion sessions** in order to present the RamsesII project and know the local "demand" in all the villages along the Kamboinsé-Yilou regional transect ; 6-7 March 2019 ; Language : Moré ; Audience : Farmers, Researchers, Government actors.

Bastide B. **2019 Discussion sessions** in order to present the RamsesII project and know the local "demand" in all the villages along the Koumbia-Dano regional transect Responsible, 6-9 February 2019 ; Languages : Dioula in Koumbia area, French and Dagara around Dano ; Audience : Farmers, Researchers, Government actors.





## List of the students

### WP1

- Biatry N., Bouali A., Bourg J., Brosse C., Cedat C., de Certaines G. Hersant T., Mena L., Therond S., Maillard F., **Mission Jeunes Experts (MJE) ROOTS (2019)** Quels sont les liens entre les populations rurales sénégalaises et les parcs agroforestiers dans les zones de Niakhar et de Khombole ? ISTOM school, 4th year **engineer report**. Co-supervisors: Droy I.(IRD), Loireau M.(IRD), Lavigne-Delville P.(IRD), Ingram V.(WUR).
- Dabone J-S. E. 2019 (waiting for the defense of his degree). Dynamique spatio-temporelle des parcs agroforestiers du transect Kamboinsé-Yilou. Professional **MSc thesis** in Geographic information system, Joseph Ki-Zerbo University, Ouagadougou, Burkina Faso (waiting for the defense of his degree), supervisor: Bastide B. (INERA).
- Diallo A. (on going) Agroforestry value chains analysis in Thies, Senegal. **MSc thesis**, Wageningen University and Research, Wageningen, Netherlands. Supervisor: V. Ingram (WUR).
- Diop M. F. (on going) Analyse de la gouvernance des parcs agroforestiers à *Faidherbia albida* et *Guiera senegalensis* dans les zones de Niakhar et Khombole, **Engineering thesis**. Ecole Nationale Supérieure d'Agriculture (ENSA), Thiès, Senegal. Co-supervisors : M. Sall (ISRA) & Ph. Lavigne-Delville (IRD).
- Duvanel T., Hamazaoui Q., Nikemia F., 2019. Cartographie du parc arboré au Burkina Faso et caractérisation de son évolution spatio-temporelle entre 2004 et 2018 Tutored project. **MSc 1** Geomatic, Joseph Ki-Zerbo University, Ouagadougou, Burkina Faso. Co-supervisors : J-F. Girres (IRD), G. Serpantié (IRD). 38p.
- Gaye S., 2019 (on going). Caractérisation des peuplements ligneux des parcs dans les paysages du centre nord bassin arachidier du Sénégal : cas de la commune de Khombole. **Engineering thesis**. Institut Supérieur de Formation Agricole et Rurale (ISFAR ex ENCR), Alioune Diop University, Bambey, Senegal. Co-supervisors : D. Sanogo (ISRA) & M. Badj (ISRA).
- Ky I. (on going). Les effets de la gouvernance et de l'innovation sur les pratiques de l'agroforesterie. Agrinovia Research **MSc thesis**, Joseph Ki-Zerbo University, Ouagadougou, Burkina Faso. Co-supervisors : Ingram V. (WUR) S. & Sanfo (WASCAL).
- Maïga A. (field works suspended). Les parcs agroforestiers soudaniens des zones denses : états, pratiques et dynamiques. Une étude comparée de terroirs (Koumbia et Dano). Research **MSc thesis** in Geography, Joseph Joseph Ki-Zerbo University, Ouagadougou, Burkina Faso. Co-supervisors : G. Serpantié (IRD), M. Loireau (IRD), L. Ouedraogo (INERA), B. Bastide (INERA).
- Mendy F. (field works suspended). Caractérisation des espaces/paysages et enquêtes espace d'intérêt au sein de 4 terroirs du projet Ramses au Sénégal . Internship carried out at the end of the double course of Bachelor's degree in





Geomatics and **MSc thesis** en Rural Geography, Dakar, Senegal. Co-supervisors : M. Loireau (IRD), M. Sall (ISRA), L. Leroux (Cirad).

Sarr N. J. (on going). Caractérisation et typologie des exploitations agricoles de la zone de Niakhar et Khombole. **Engineering thesis**, Ecole Nationale Supérieure d'Agriculture (ENSA), Thiès, Senegal. Co-supervisors : M. Sall (ISRA) & Ph. Lavigne-Delville (IRD).

Silga T. (on going) Analyse des chaîne de valeur des produits forestiers non ligneux sur le transect Komboinsé Yilou, Agrinovia **MSc thesis**, Joseph Joseph Ki-Zerbo University, Ouagadougou, Burkina Faso. Co-supervisors : J. van den Berg (WUR), S. Sanfo (WASCAL).

Sonko M., 2019. Caractérisation des peuplements ligneux des parcs du centre sud bassin arachidier : Cas l'arrondissement de Niakhar (région de Fatick, Sénégal). **Engineering thesis** de l'Institut Supérieur de Formation Agricole et Rurale (ISFAR ex ENCR), Alioune Diop University, Bambey, Senegal. Co-supervisors: Sanogo D. (ISRA) et M. Badj (ISRA).

Thiombiano I. A. 2019. Etat et facteurs de changement des parcs agroforestiers dans la commune de Koumbia. Water and Forests **Inspector thesis**. Bobo-Dioulasso University. 57 p. Co-supervisors: Bastide B. (INERA) & Ouoba H. (Bobo-Dioulasso University).

Tiemtore E. (on going). Impact des Produits Forestiers sur l'alimentation et le revenu des ménages : cas du village de Ioffing. Agrinovia **MSc thesis**, Joseph Joseph Ki-Zerbo University, Ouagadougou, Burkina Faso. Co-supervisors: Ingram V. (WUR), Sanfo S. (WASCAL).

Zerbo G. L. 2019 (waiting for the defense of his degree). Impact des pratiques humaines sur la régénération et la production fruitière du karité (*Vitellaria paradoxa* C. F. Gaertn) dans les villages de Djuié et Guena au Burkina Faso. **MSc thesis** in Integrated Management of Natural Resources. Specialty: forestry production, 72 p. Supervisor : Bastide B. (INERA).

Zidouemba R. (on going) Analyse des chaîne de valeur des produits forestiers non ligneux à Lofing (transect Koumbia Dano), Agrinovia **MSc thesis** Université de Ouagadougou. Co-supervisors : van den Berg J. (WUR) & Sanfo S. (WASCAL).

Albers P. 2019. Linking household strategies to natural regeneration in West African parklands--Farmer managed natural regeneration as a restoration practice. WUR **MSc thesis**, Word Agroforestry Research (ICRAF), Wageningen, Netherlands, 45 p. + 14 appendix. Supervisor : Bongers F. (WUR).

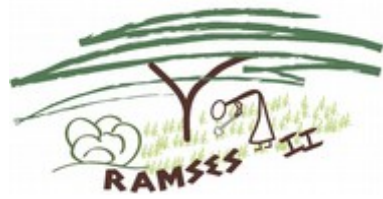
Morel S. 2019. How climate-smart is farmermanaged--natural--regeneration (FMNR) as a--restoration practice ? Assessing the resilience of West--African parklands using a trait based—approach. WUR **MSc thesis**, Word Agroforestry Research (ICRAF), Wageningen, Netherlands, 37p + 4 appendix. Supervisor : Bongers F. (WUR).

## WP2

Agbohessou F. Y. (on going) Effets du *Faidherbia albida* (Del.) A. Chev. sur la productivité aérienne et souterraine de la culture associée (arachide) : Utilisation



- des drones pour l'estimation du rendement et du Land-Equivalent-Ratio (LER), de la parcelle au système agro-sylvo-pastoral. **MSc thesis**, UCAD University, Dakar, Senegal. Co-supervisors : O. Roupsard (Cirad), M.S. Sarr (ISRA), C. Jourdan (Cirad), C. Clermont-Dauphin ;
- Diatta F. (on going) Influence du *Faidherbia albida* sur les ressources du sol et l'élaboration du rendement du mil dans village de Poudaye au sein du bassin arachidier au Sénégal. Interactions avec les pratiques des agriculteurs. **MSc thesis**, UCAD University, Dakar, Senegal. Co-supervisors : C. Clermont-Dauphin (IRD), L. Leroux (Cirad), M. N'dienor (ISRA), H.S. Ba (ISRA), C. Jourdan (Cirad) ;
- Diatta, S. (on going). Estimation du stock et du stockage annuel de carbone dans la biomasse aérienne de *Faidherbia albida* (Del.) A chev du parc agroforestier de Sob (Observatoire de Niakhar, Sénégal) : approches par inventaires et dendrochronologie. **MSc thesis**, Ecole Nationale Supérieure d'Agriculture (ENSA), Thiès, Senegal. Supervisors : O. Roupsard (Cirad) ;
- Diouf A. (on going) Influence du *Faidherbia albida* sur les ressources du sol et l'élaboration du rendement du Mil au niveau du village de Diohine dans le bassin arachidier au Sénégal –interaction avec les pratiques des agriculteurs. **MSc thesis**, UCAD University, Dakar, Senegal. Co-supervisors : M. N'dienor (ISRA), C. Clermont-Dauphin (IRD), L. Leroux (Cirad), H.S. Ba (ISRA), C. Jourdan (Cirad).
- Diouf K. (on going) Evaluation de la transpiration par la mesure du flux de sève chez l'espèce agroforestière *Faidherbia albida* (Del.) dans le bassin arachidier du **MSc thesis**. Ecole Nationale Supérieure d'Agriculture (ENSA), Thiès, Senegal. Co-supervisors : F. Do (IRD), M.S. Sarr (ISRA), O. Roupsard ;
- Mboh M. (on going) Influence du *Faidherbia albida* sur les ressources du sol et l'élaboration du rendement du Mil au niveau du village de Thilla-ounte/Khombole dans le bassin arachidier au Sénégal –interaction avec les pratiques des agriculteurs. **MSc thesis**, UCAD University, Dakar, Senegal. Co-supervisors : L. Leroux (Cirad), C. Clermont-Dauphin (Ird), M. N'dienor (ISRA), H.S.Ba (ISRA) C. Jourdan (Cirad) ;
- Ouattara Sadia (2019-2021) : Etude des paramètres de fructification du karité (*Vitellaria paradoxa* C.F. Gaertn.) en zone sud soudanienne du Bukina Faso ». **PhD**, Joseph Ki-Zerbo University, Ouagadougou, Burkina Faso. Supervisor : Some-Dao M. (INERA).
- Ouedraogo S. A. (on going). Effet de la densité arbres de karité sur la productivité du sorgho dans les parcs agroforestiers de Koumbia. **MSc thesis**, Joseph Ki-Zerbo University, Ouagadougou, Burkina Faso. Co-supervisors : J. Sanou (INERA), Koala J. (INERA), H. R. Bazié (INERA), C. Clermont -Dauphin (IRD), C. Jourdan (Cirad) ;
- Sam J. (on going): Effet de l'ombrage du *Vitellaria paradoxa* sur la diversité floristique des parcs agroforestiers de Dano et de Koumbia. **MSc thesis**; Joseph Ki-Zerbo University, Ouagadougou, Burkina Faso. Co-supervisors : Koala J. (INERA), J. Sanou (INERA), H. R. Bazié (INERA), C. Clermont -Dauphin (IRD), C. Jourdan (Cirad) ;



Sane A (on going) Influence du *Faidherbia albida* sur les ressources du sol et l'élaboration du rendement du Mil au niveau des villages de Toucar et Poultock-Diohine dans le bassin arachidier –interaction avec les pratiques des agriculteurs du village de Toucar. **MSc thesis**, UCAD, Dakar, Senegal. Co-supervisors : C. Clermont-Dauphin (IRD), L.Leroux (Cirad), M.N'dienor (ISRA), H.S.Ba (ISRA), C.Jourdan (Cirad).

Sawanogo B. G. F. (on going) : Effet de l'élagage des branches sur la productivité du sorgho dans des parcs à karité dans la zone de Dano. **MSc thesis**, Joseph Ki-Zerbo University, Ouagadougou, Burkina Faso. Co-supervisors : J. Sanou (INERA), Koala J. (INERA), H. R. Bazié (INERA), C. Clermont -Dauphin (IRD), C. Jourdan (Cirad) ;

Traore A.K. (on going): Distribution de la biomasse racinaire dans les parcs agroforestiers de Dano et de Koumbia. **MSc thesis**, Joseph Ki-Zerbo University, Ouagadougou, Burkina Faso. Co-supervisors : Koala J. (INERA), J. Sanou (INERA), H. R. Bazié (INERA), C. Clermont -Dauphin (IRD), C. Jourdan (Cirad).

### WP3

Sow, S., **PhD** (2019-2021). Modélisation des services écosystémiques des systèmes agroforestiers d'Afrique de l'Ouest. PhD, UCAD University, Dakar, Senegal. Co-supervisors : Rousard O. (Cirad), Pr. Sall S.N. (Dakar Univ.), Sanogo D. (ISRA).

Kpadonou R. **PhD** (2019-2021). Analyse des options d'intensification durables en vue de la sécurité alimentaire et une agriculture à faibles émissions dans les parcs agroforestiers sahéliens : Approche par la modélisation bioéconomique, UAC University, Cotonou, Benin. Supervisor : Sanfo S. (WASCAL).

### WP4

Zerbo G. L. **PhD** (2020-2023). Impacts des formations en grappe des productrices de karité supervisées par l'INERA depuis 2012 dans la région de Koumbia (Burkina Faso). Supervisor : Bastide B. (INERA).

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## Financial expenditure on the IRD's ANR budget (2018-2019)

### Bilan IRD 2018-2019

	Credit ANR	Dépenses IRD	
		2018	2019
Fonctionnement	138,887.04	10,526.08	25,150.52
Frais de structure IRD 8%	11,110.96		
<b>TOTAL BUDGET</b>	<b>149,998.00</b>	<b>10,526.08</b>	<b>25,150.52</b>
<b>Répartition par UMR IRD</b>			
HSM		2,461.82	10,267.96
Eco&Sols		2,426.45	1,213.30
Résiliances		2,877.40	3,347.73
GRÉD		0.00	7,159.52
Espace-Dev		2,760.41	3,162.05
Frais Structure UMR 7%			
<b>Total</b>		<b>10,526.08</b>	<b>25,150.56</b>
<b>Cumul</b>		10,526.08	35,676.64

### Détails UMR HSM

DEPENSES 2018					
Unité	Code	CC	Fournisseurs	Désignation	EUROS
HSM	Mission Burkina	050 F2 CVNTE	BIDOU Jean-Etienne - du 2 au 12 septembre	American Expres/Voyage _ Bordeaux/Ouaga A/R	1,299.11 €
HSM	Mission Burkina	050 F2 CVNTE	BIDOU Jean-Etienne - du 2 au 12 septembre	American Expres/Voyage	10.00 €
HSM	Mission Burkina	050 F2 CVNTE	BIDOU Jean-Etienne - du 2 au 12 septembre	Frais de Visa	
HSM	Mission Burkina	050 F2 CVNTE	BIDOU Jean-Etienne - du 2 au 12 septembre	Perdiems _ OM n° 244595	1,152.71 €
<b>Somme HSM</b>					<b>2,461.82 €</b>

DEPENSES 2019					
Unité	Code	CC	Fournisseurs	Désignation	EUROS
HSM	Mission Burkina	050 F2 CVNTE	BIDOU Jean-Etienne _ du 29/01 au 14/02	Notilus FCM _ Billet d'avion	501.21 €
HSM	Mission Burkina	050 F2 CVNTE	BIDOU Jean-Etienne _ du 29/01 au 14/02	Perdiems _ OM n° 252419 (y compris visa)	2,239.62 €
HSM	Congrès agroforesterie	050 F2 CVNTE	BIDOU Jean-Etienne	Frais inscription Congrès du 20 au 22 mai	450.00 €
HSM	Congrès agroforesterie	050 F2 CVNTE	JOURDAN Christophe	Frais inscription Congrès du 20 au 22 mai	513.64 €
HSM	Mission Sénégal	050 F2 CVNTE	Jean-Etienne BIDOU _ du 4 au 22 juin	FCM_Billet d'avion	1,135.25 €
HSM	Mission Sénégal	050 F2 CVNTE	Jean-Etienne BIDOU _ du 4 au 22 juin		3.10 €
HSM	Mission Sénégal	050 F2 CVNTE	Jean-Etienne BIDOU _ du 4 au 22 juin	Perdiems _ OM n° 258850	1,802.73 €
HSM	Mission Sénégal	050 SN CVNTE	Chauffeur Bernard BASSENE _ ISTOM	Contrat prestation n° 57 du 12/07 au 08/08	1,283.78 €
HSM	Mission Sénégal	050 SN CVNTE	Chauffeur Hervais SAGNA _ ISTOM	Contrat prestation n° 56 du 12/07 au 08/08	1,283.78 €
HSM	Mission Sénégal	050 SN CVNTE	Fonctionnement terrain _ ISTOM	Dépenses de terrain - Fournitures entretien	1,054.85 €
HSM	Mission Sénégal	050 SN CVNTE	Minibus IRD - Accueil du 8 juillet aéroport ISTOM/IRD	Frais de parking et péage (4 000 fcf)	
<b>Somme HSM</b>					<b>10,267.96 €</b>

### Détails UMR Eco&Sols

DEPENSES 2018					
Unité	Code	CC	Fournisseurs	Désignation	EUROS
ECO&SOLS	Mission Burkina	210 SN CVNAP	CLERMONT-DAUPHIN Cathy _ du 2 au 10 septembre_Ouaga	American Expres/Voyage _ Thiès/Ouaga A/R	1,000.52 €
ECO&SOLS	Mission Burkina	210 SN CVNAP	CLERMONT-DAUPHIN Cathy _ du 2 au 10 septembre_Ouaga	Frais de Visa	
ECO&SOLS	Mission Burkina	210 SN CVNAP	CLERMONT-DAUPHIN Cathy _ du 2 au 10 septembre_Ouaga	Perdiems _ OM n° 244519	754.68 €
ECO&SOLS	Mission Burkina	210 SN CVNAP	CLERMONT-DAUPHIN Cathy _ du 2 au 10 septembre_Ouaga	Perdiems _ OM n° 244519_Complément	471.25 €
ECO&SOLS	Mission Sénégal	210 SN CVNAP	CLERMONT-DAUPHIN Cathy _ du 8 au 13 octobre_Dakar-Niakhar	Forfait perdiems	200.00 €
<b>Somme ECO&amp;SOLS</b>					<b>2,426.45 €</b>

DEPENSES 2019					
Unité	Code	CC	Fournisseurs	Désignation	EUROS
ECO&SOLS	Mission Sénégal	050 SN CVNTE	CLERMONT-DAUPHIN Cathy _ du 11 au 13 juin	Perdiems_OM n° 263358	15.00 €
ECO&SOLS	Mission Sénégal	050 SN CVNTE	CLERMONT-DAUPHIN Cathy _ du 11 au 13 juin	Perdiems_OM n° 263358	132.48 €
ECO&SOLS	Mission Sénégal	050 SN CVNTE	CLERMONT-DAUPHIN Cathy _ du 10 au 12 juillet	Perdiems_OM n° 262636	147.48 €
ECO&SOLS	Mission Sénégal	050 SN CVNTE	CLERMONT-DAUPHIN Cathy _ du 18 au 19 juillet	Perdiems_OM n° 262797	88.16 €
ECO&SOLS	Mission Sénégal	050 SN CVNTE	CLERMONT-DAUPHIN Cathy _ du 23 août	Perdiems_OM n° 265938	22.04 €
ECO&SOLS	Mission Sénégal	050 SN CVNTE	CLERMONT-DAUPHIN Cathy _ du 11 au 12 septembre	Perdiems_OM n° 265198	88.16 €
ECO&SOLS	Mission Sénégal	050 SN CVNTE	CLERMONT-DAUPHIN Cathy _ du 26 au 27 septembre	Perdiems_OM n° 262957	88.16 €
ECO&SOLS	Mission Sénégal	050 SN CVNTE	CLERMONT-DAUPHIN Cathy _ Dépenses sur ERD n° 2270	Joint Presse - GPS + Chargeurs - VTT occasion	179.13 €
ECO&SOLS	Mission Sénégal	050 SN CVNTE	CLERMONT-DAUPHIN Cathy _ Dépenses sur ERD n° 2270	Joint Presse - GPS + Chargeurs - VTT occasion	452.69 €
<b>Somme ECO&amp;SOLS</b>					<b>1,213.30 €</b>



### Détails UMI Résiliences

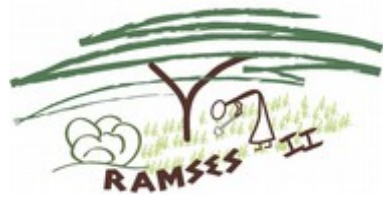
DEPENSES 2018					
Unité	Code	CC	Fournisseurs	Désignation	EUROS
RESILIENCE	Mission Burkina	236 F3 CVNEP	DROY Isabelle _ du 2 au 11 septembre	American Expres/Voyage _ Bordeaux/Ouaga A/R	1,431.11 €
RESILIENCE	Mission Burkina	236 F3 CVNEP	DROY Isabelle _ du 2 au 11 septembre	Frais de Visa	
RESILIENCE	Mission Burkina	236 F3 CVNEP	DROY Isabelle _ du 2 au 11 septembre	Perdiems _ OM n° 244446	1,420.37 €
RESILIENCE	Mission Burkina	236 F3 CVNEP	DROY Isabelle _ du 2 au 11 septembre	ERD	25.92 €
<b>Somme RESILIENCE</b>					<b>2,877.40 €</b>

DEPENSES 2019					
Unité	Code	CC	Fournisseurs	Désignation	EUROS
RESILIENCE	Mission Burkina	050 F3 CVNTE	DROY Isabelle _ du 29/01 au 14/02	Notilus FCM _ Billet d'avion	498.11 €
RESILIENCE	Mission Burkina	050 F3 CVNTE	DROY Isabelle _ du 29/01 au 14/02	Perdiems _ OM n° 252442 (y compris visa)	1,290.00 €
RESILIENCE	Mission Burkina	050 BF CVNTE	Facturation interne 2019_Frais kms	Véhicules IRD Ouaga (I. Droy du 5 au 9 février)	208.09 €
RESILIENCE	Mission Burkina	050 BF CVNTE	BELEM Daouda _ du 5 au 9/02	Perdiems _ OM n° 253598	198.18 €
RESILIENCE	Mission Sénégal	050F3CVNTE	DROY Isabelle _ du 28/10 au 13/12	Notilus FCM_Billet d'avion_OM n° 266579 (897.25 €)	
RESILIENCE	Mission Sénégal		DROY Isabelle	y compris frais modification billet 253 euros + 3.10 euros	1,153.35 €
<b>Somme RESILIENCE</b>					<b>3,347.73 €</b>

### Détails UMR GRED

DEPENSES 2018						
Unité	Code	CC	Fournisseurs	Désignation	EUROS	
GRED			Aucune dépense en 2018			
<b>Somme GRED</b>					<b>0.00 €</b>	

DEPENSES 2019					
Unité	Code	CC	Fournisseurs	Désignation	EUROS
GRED	Mission Burkina	050 F2 CVNTE	SERPANTIE Georges _ du 21/01 au 25/02	Notilus FCM _ Billet d'avion	630.04 €
GRED	Mission Burkina	050 F2 CVNTE	SERPANTIE Georges _ du 21/01 au 25/02	Perdiems _ OM n° 251969	869.96 €
GRED	Mission Burkina	050 BF CVNTE	SERPANTIE Georges _ ERD du 6 juin	Carburants & Lubrifiants	188.88 €
GRED	Mission Burkina	050 F2 CVNTE	GIRRE Jean-François _ du 21/01 au 29/01	Notilus FCM _ Billet d'avion	630.04 €
GRED	Mission Burkina	050 F2 CVNTE	GIRRE Jean-François _ du 21/01 au 29/01	Perdiems _ OM n° 251970	869.96 €
GRED	Mission Burkina	050 BF CVNTE	YOUGBARE Saïfou _ du 25 au 27/01	Véhicule de service	
GRED	Mission Burkina	050 BF CVNTE	YOUGBARE Saïfou _ du 25 au 27/01	Perdiems _ OM n° 252847	97.87 €
GRED	Mission Burkina	050 BF CVNTE	Facturation interne 2019_Frais kms	Véhicules IRD Ouaga (G. Serpantié du 28/01 au 05/02)	27.15 €
GRED	Mission Burkina	050 BF CVNTE	Facturation interne 2019_Frais kms	Véhicules IRD Ouaga (G. Serpantié du 25/01 au 28/01)	222.16 €
GRED	Mission Burkina	050 BF CVNTE	Facturation interne 2019_Frais kms	Véhicules IRD Ouaga (G. Serpantié du 20/02 au 24/02)	168.26 €
GRED	Mission Burkina	050 BF CVNTE	SERPANTIE Georges _ Dépenses Fonctionnement	Etudes et Recherches (juin 2019)	18.29 €
GRED	Mission Burkina	050 BF CVNTE	SERPANTIE Georges _ Dépenses Fonctionnement	Autres Frais Divers (juin 2019)	13.72 €
GRED	Mission Burkina	050 BF CVNTE	SERPANTIE Georges _ Dépenses Fonctionnement	Fournitures Entretien (juin 2019)	48.78 €
GRED	Mission Burkina	050 BF CVNTE	SERPANTIE Georges _ Dépenses Fonctionnement	Carburants & Lubrifiants (juin 2019)	222.58 €
GRED	Mission Burkina	050 BF CVNTE	NIGNAN Saïbou _ ERD du 25/03	Catalogue et Imprimerie	10.18 €
GRED	Mission Burkina	050 BF CVNTE	NIGNAN Saïbou _ ERD du 25/03	Autres frais divers	109.76 €
GRED	Mission Burkina	050 BF CVNTE	NIGNAN Saïbou _ ERD du 29/04	Catalogue et Imprimerie	4.14 €
GRED	Mission Burkina	050 BF CVNTE	NIGNAN Saïbou _ ERD du 29/04	Autres frais divers	128.06 €
GRED	Mission Sénégal	050 F2 CVNTE	Philippe-Lavigne DELVILLE _ du 5 au 17 juin	Notilus FCM_Billet d'avion	959.88 €
GRED	Mission Sénégal	050 F2 CVNTE	LAIGNE Philippe-Lavigne _ du 5 au 17 juin	Perdiems _ OM n° 259266	1,539.45 €
GRED	Mission Burkina	050 BF CVNTE	BELEM Daouda _ du 20 au 24/02_Ouaga/Dano	Perdiems _ OM n° 254331	198.18 €
GRED	Mission Burkina	050 BF CVNTE	NIGNAN Saïbou _ du 20 au 23/02_Bobo/Dano	Perdiems _ OM n° 254330	121.23 €
GRED	Mission Burkina	050BFCVNTE	Acquisition de photos IGB	Scannage de photos	44.97 €
GRED	Mission Burkina	050BFCVNTE	Acquisition de photos IGB	Mission 89097 du 21/10 -B. Zopyou	17.99 €
GRED	Mission Burkina	050BFCVNTE	Acquisition de photos IGB	Mission 89101 du 21/10 -B. Bougouriba	17.99 €
<b>Somme GRED</b>					<b>7,159.52 €</b>



Détails UMR Espace-Dev

DEPENSES 2018					
Unité	Code	CC	Fournisseurs	Désignation	EUROS
ESPACE DEV	Mission Burkina	050 F2 CVNTE	LOIREAU Maud _ du 1 au 12 septembre	American Expres/Voyage _ Mpi/Ouaga A/R	1,412.76 €
ESPACE DEV	Mission Burkina	050 F2 CVNTE	LOIREAU Maud _ du 1 au 12 septembre	American Expres/Voyage	
ESPACE DEV	Mission Burkina	050 F2 CVNTE	LOIREAU Maud _ du 1 au 12 septembre	Perdiems _ OM n° 244396 (visa inclus)	1,347.65 €
<b>Somme ESPACE DEV</b>					<b>2,760.41 €</b>

DEPENSES 2019					
Unité	Code	CC	Fournisseurs	Désignation	EUROS
ESPACE DEV	Mission Burkina	050 F2 CVNTE	LOIREAU Maud _ du 04/02 au 15/02	Notilus FCM _ Billet d'avion	811.04 €
ESPACE DEV	Mission Burkina	050 F2 CVNTE	LOIREAU Maud _ du 04/02 au 15/02	Perdiems _ OM n° 252707 (y compris visa)	1,602.92 €
ESPACE DEV	Mission Sénégal	050 F2 CVNTE	LOIREAU Maud _ du 31/10 au 29/11 (MLD)	Notilus FCM _ Billet d'avion Dakar (OM n° 267847)	748.09 €
<b>Somme ESPACE DEV</b>					<b>3,162.05 €</b>

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