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THE PROJECT RUSSADE (NETWORK OF SAHELIAN UNIVERSITIES FOR FOOD SECURITY AND ENVIRONMENTAL SUSTAINABILITY): THE ROLE OF UNIVERSITIES AS ENGINES OF DEVELOPMENT

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Abstract

The project Russade attempted to give a solution to the lack of skilled professionals in Sahelian countries employed in key structures to ensure food security and improve local productions in a sustainable and environmental respectful perspective. An active network has been established between four universities to improve knowledge and know-how and a new Master course on "Food Security and Environmental Sustainability" was implemented with an interdisciplinary and multidisciplinary approach. The reinforced capacity of the institutions ensures the training of more competent professionals who can effectively participate in sustainable development emphasizing the links between learning, research and professional practice.

Il progetto Russade ha tentato di dare una soluzione alla mancanza di professionisti qualificati nei paesi saheliani impiegati in strutture chiave per garantire la sicurezza alimentare e migliorare le produzioni locali con una visione sostenibile e rispettosa dell'ambiente. È stata creata una rete attiva tra quattro università per migliorarne le competenze e un nuovo corso di Master su "Sicurezza alimentare e sostenibilità ambientale" è stato attivato con un approccio interdisciplinare e multidisciplinare. Il rafforzamento delle istituzioni garantisce la formazione di professionisti più competenti che possono partecipare efficacemente allo sviluppo sostenibile, sottolineando i collegamenti tra apprendimento, ricerca e pratica professionale.

Keywords

Sahel, Food Security, Environmental Sustainability, Interdisciplinarity

Introduction

The project Russade (Réseau des Universités Sahéliennes pour la Sécurité Alimentaire et la Durabilité Environnementale / Network of Sahelian Universities for Food Security and Environmental Sustainability - FED/2013/320-115) (<http://www.russade.eu>- www.cisao.unito.it)

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was funded by the European Union in the ACP-UE Cooperation program in higher education Edulink II. The project was led by the University of Turin (Interdepartmental Centre of Research and Technical and Scientific Cooperation with Africa, Cisao), Italy, in partnership with the University Abdou Moumouni of Niamey – Faculty of Agronomy, Regional Centre for Specialized Education in Agriculture (Cresa), Niger, the Polytechnic University of Bobo Dioulasso - Laboratoire d'Études des Ressources Naturelles et des Sciences de l'Environnement (Lernse), Burkina Faso, and the National Institute of Sciences and Technologies of Abéché (Insta), Chad.

The main goal of this project was to improve knowledge and know-how of Sahelian Higher Education Institutions (HEIs) to fight hunger and poverty and assure food security. An active network has been established between the four involved universities, developing scientific, technical and didactic collaborations to increase attention and care for sustainable development and environmental safeguard. A new Master course (French Licence Master Doctorate – LMD system) on "Food Security and Environmental Sustainability" was offered to students in order to enhance different strategic topics: livestock and agricultural productions, food security and safety, environmental protection, sustainable management of natural resources, communication skills, projects management. Lessons were organized according to an interdisciplinary and multidisciplinary approach and teachers shared their experiences with colleagues from different countries. The delivered diplomas are internationally recognized in Africa.

To enhance the role of universities as engines of development, the project promoted teachers and students mobility, encouraged an interactive approach sharing their skills and delivered didactical programmes according to local needs and labour markets to face challenges of sustainable agriculture and environmental protection.

10 students (1 woman, 9 men) with different previous curricula were enrolled in the Master, organized in six months of lectures supported and supplemented by six months of internships dedicated to qualifying experiences carried out in the technical structures of ministries, training and research institutions, enterprises and NGOs of Niger, Burkina Faso, Chad and Togo.

Results and outcomes of the project and of the master were evaluated by internal monitoring and external evaluation. The reinforced capacity of the HEIs ensures the training of more competent professionals who can effectively participate in sustainable development and poverty reduction strategies in their countries. The evidence of this is given considering the working and recruitment situation of the graduates of the Master. All of them had a working progression in the same employer or new recruitment according to their acquired skills. The internships' institutions

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managers confirmed the correspondence between the offered training and the needs of field expertise to administer locally projects and interventions on sustainable development.

Aims and actions of the project RUSSADE

One of the main elements of the project Russade, as well as the Edulink II program (<http://www.acp-hestre.eu/edulink-about-contact>), is the strengthening of academic collaboration at the international level, particularly South-South and North-South. In this context, the approach followed was to bring together the partner universities and to develop a common vision of priorities for the Sahelian areas concerning food security and environmental sustainability and to share a new educational approach (Semita *et al.*, 2013a; 2013b; 2014a).

Therefore the four centres of higher education developed an ambitious and innovative pilot program (Fig. 1), integrating their different visions and each giving a specific look at the priorities of their countries (<http://www.un.org/sustainabledevelopment/fr/objectifs-de-developpement-durable/>).

The logical connections of the project

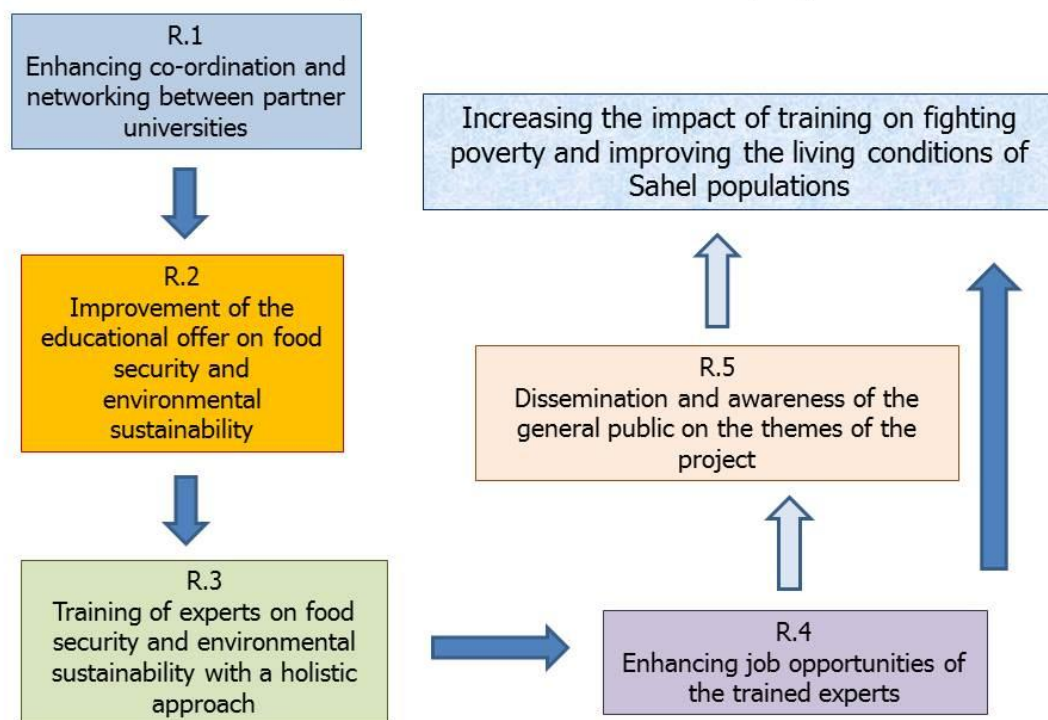


Figure 1 –Connection between the results of the project RUSSADE and the main goal (scheme of B. Mola, modified).

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The project Russade proposed a new training program, a Master course, with a systemic and multidisciplinary approach, organized through an active network between the four partner universities. Thanks to the educational offer of the course, students' capacities were reinforced in the various strategic areas, such as livestock, agriculture, food security and environmental protection (Semita et al., 2014b), with the aim to enable them to face the challenges and constraints of rural development and to take into account the links between the different themes (Figures 2, 3 and 4).



Figure 2–Study visit to the centre for the improvement of energy production and use (Region of Tillabéri), by P. Barge



Figure 3 – Production of pellets from agricultural residues (Niamey), by P. Barge



Figure 4 - Practical courses to test the effectiveness of solar ovens and the possibility of reducing and contrasting deforestation, by P. Barge.

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The first edition of this Master began in February 2015 in accordance with the calendar of the University of Niamey.

| | | Teaching Units | Teaching modules | Credits |
|--|----------------------------------|---|--|-----------|
| Compulsory | Fundamental | 1: Livestock and crops productions | 1. Improvement of animal production systems | 3 |
| | | | 2. Improvement of vegetal production systems | 3 |
| | | 2: Land and natural resources management | 3. Land management | 1 |
| | | | 4. Integrated management of soil fertility | 1 |
| | | | 5. Waste management and recycling | 1 |
| | | | 6. Water supply | 1 |
| | | | 7. Using solar energies | 1 |
| | | 3: Valorisation of agro-food products | 8. Conservation, processing and packaging | 2 |
| | | | 9. Marketing | 1 |
| | Transversal | 4: Policies and development strategies | 10. Cooperation activities planning and management | 3 |
| | | 5: Biodiversity and biosecurity | 11. Biosecurity | 1 |
| | | | 12. Sustainable management of biodiversity and protected areas | 2 |
| | | 6: Methods and communication tools | 13. Tools of communication and advocacy | 2 |
| | | | 14. Outreach methods and tools | 2 |
| | | | 15. Methods of collecting and analysing data (HEA and others) | 1 |
| | | 7: Global and local aspects of food security and sustainable development | 16. Food security and sovereignty | 1 |
| | 17. Environmental sustainability | | 1 | |
| | Workshops | 8: Workshops on food security and environmental sustainability | Quality and Food Security | 0 |
| | | | Street foods in African cities | 0 |
| | | | Food security and Public Health | 0 |
| Improving agriculture and rural sustainability | | | 0 | |
| Optional | 9 : Optional courses | 18. GIS and remote sensing | 1 | |
| | | 19. WASH (Water, Sanitation and Hygiene) | 1 | |
| | | 20. Using other renewable energies | 1 | |
| TOTAL CREDITS | | | | 30 |

Table 1 – Teaching modules in the Master “Food security and environmental sustainability”

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The program, included in the didactic offer of the Faculty of Agronomy and the Regional Centre for Specialized Education in Agriculture (Cresa), has been recognized by the African and Malagasy Council for Higher Education (Cames). The issued diplomas are valid in all the countries of Africa. The training program consisted of 20 teaching modules (Table 1) in a period of six months (30 credits), which involved the participation of 49 teachers from six different nationalities (Niger, Burkina Faso, Chad, Mali, France and Italy) and one period of six months of field training (30 credits).

Most of the courses have seen the integration of teachers from different universities delivering the lectures, including experts of ONGs, the International Fund for Agricultural Development (Ifad) of the United Nations, Delegation of the European Union Commission in Niger, the Protected Areas Division of the Nigerien Ministry of the Environment and from the staff of the Regione Piemonte (Cerutti, 2017). Moreover theoretical courses were alternated with practical courses: 8 field trips were carried out with the local support of the ONG Terre Solidali and the administration of the W National Park (Fig. 5 and Fig. 6). Seminars/debates, open to the participation of other students and researchers, completed the educational offer.



Figures 5 and 6–Field trip to protected areas: the students’ visit was guided by the teachers and staff of the W National Park.

The Master enrolled 10 students (5 Nigeriens, 3 Chadians, 1 Togolese and 1 Burkinabe, 1 woman, 9 men), with various specializations (agronomists, biologists, geologists, etc.). All participants have duly completed their study course by obtaining their Master's degree between April and July 2016 (Semita et al., 2017).

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Sharing skills enabled the enrichment of the formative offer with diversified experiences which were reinforced in the various training modules. The importance of this dynamic was testified by the students, who noted that the regional dimension of training, as well as the North-South partnership, were the motivations to prefer the Master “Food Security and Environmental Sustainability” to the others available in their universities.

The Master was built on a core of knowledge that is already the subject of research-action carried out by the Cresa (land management and restoration, agro-pastoral production chains, small farmer organization and strategies, local development) with the disciplinary integrations offered by Burkinabe and Chadian teachers and by the members of the Cisao, in an institutional framework of sharing and collective vision of the themes (<https://www.cisao.unito.it>).

This approach takes into account the link between science and development, which has so far been neglected by political decision-makers in the Sahel countries, considering it strategic in order to increase the impact of research on improving the living conditions of the local population. (Barge et al., 2015; Semita and Ferrero, 2015).

The pedagogical programs agreed by the partners therefore consider the close relationship between research (emergence of new scientific knowledge), training (strengthening of professional capacities and infrastructures in the scientific and technological field) and innovation (transfer of appropriate basic knowledge).

The final dissertations of the graduates

The final dissertations (Fig. 7) of the first promotion of the Master II "Food Safety and Environmental Sustainability", took place at the Cresa of the Faculty of Agronomy of the University Abdou Moumouni of Niamey (Niger).

The titles of the thesis of the students who have concluded the first edition of the Master are listed in Table 2.

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Figure 7 –The international Commission of the Master evaluated the candidates after their final dissertation, by B. Mola.

| Student Name | Thesis title | Host Institution |
|----------------------------------|--|---|
| Nazal Alhadji Markhous (Chad) | Multifunctional analysis of urban and peri-urban agriculture: the case of horticulture in the city of N'Djamena (Chad) | Institut Tchadien de la Recherche Agronomique pour le Développement N'Djamena, Chad |
| Izadine Ahmat(Chad) | Diachronic analysis of the indicators of the results of the harmonized framework in Chad for the period November 2013 - March 2015: the case of the regions Chari-Baguirmi, Mandouland Sila. | Centre Régional AGRHYMET Niamey, Niger |
| Adama Bamogo (Burkina Faso) | Contribution of biodigester technology to the sustainability of family farms in Burkina Faso | Programme National Bio-digesteur, PNB-BF Burkina Faso |
| Egle Homenya Komla (Togo) | Contribution of the intensive rice-farming system to the sustainability of farms in Southern Togo | ONG GRED (Groupe de recherche-action pour l'éducation au développement) Lomé, Togo |

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|---------------------------------------|--|---|
| Soumeyla Abdoul-Zalili (Niger) | Water and soil potential for the development of irrigation in the Dallol Bosso: "Case of the Departments of Boboye and Falmey" | Lux Dev Conseil Régional Dosso, Niger |
| Abdoulkadri Djibrilla (Niger) | Artificial insemination in Niger: current situation and ways of improvement | PNAG Ministère Elevage Niamey, Niger |
| Garba Boulamine Mounkaila(Niger) | Socio-economic analysis of the effects of FAO interventions on strengthening the resilience of vulnerable households in the commune of Kalfou, Tahoua region | FAO Niamey, Niger |
| Abourahamane Toure Kadidiatou (Niger) | Diachronic analysis of Niger's harmonized framework of indicators for the period November 2013-March 2015: the case of Abala, Ouallam and Filingue departments | Centre Régional AGRHYMET Niamey, Niger |
| Alhassane Ahmad (Niger) | Use of improved millet varieties in rainfed agriculture in response to climate change: case of Tillabéry department | COOPI Niamey – Tillabéri, Niger |
| Djekornondé Miabe(Chad) | Analysis of vegetable crops and their contribution to the food security of market gardening households in the department of Dagana in Chad | Programme National de Sécurité Alimentaire COOPI N'Djamena, Chad |

Table 2 – List of the thesis discussed at the end of the Master

A selection of papers was presented in the form of full articles (Bamogoet *al.*, 2017; Boulamine and Soumana, 2017; Egle et al., 2017; Nazal et al., 2017), which illustrate the different themes and areas of sustainable development and food security that have been touched through the individual research and to insert these data in the cyclical vision of relationships and interconnections of sustainable development. The papers report the scientific results obtained by the students during the training. The students developed the knowledge acquired on different themes during the first part of the Master with a practical application in the service of the host institutions, always emphasizing the multidisciplinary and holistic approach adopted.

On January 2017, the project supported the presence of faculty members and academic representatives from the partner institutions of Burkina Faso, Niger, Chad and Italy, in N'Djamena (Chad), where a synthesis of each dissertation (AA.VV., 2017a) was proposed in a poster exhibition (Fig. 8).

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Figure 8 – Closing workshop of the project in N'Djamena (Chad). Visit of the delegates to the posters exhibit, by P. Barge.

Results in terms of employment

A survey of the conditions of employment of graduates, carried out six months after the end of the Master's degree, revealed that two graduates found their work just after the Master and that six, already employed, improved their situation. The two graduates who had no job at the time of the survey had a temporary experience that was a consequence of the Master.

The fact that all the graduates work in the disciplinary field of the Master demonstrates the adequacy of training to the demand of work in the sector.

These data, combined with the perception of the executives interviewed, show that the Master can contribute to better employability of young executives in the area of food security and environmental sustainability. The internship, in particular, has proved to be an excellent entry point into the labour market and for this reason it is an experience that deserves to be repeated and reinforced in future editions.

The Master also seems to contribute to the improvement of the conditions of employment, not only from the point of view of positions and functions, but also from a point of view of relationships and job satisfaction. Economic treatment is the only aspect on which improvement is limited.

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The diffusion of educational products

Dissemination of project results and awareness raising on issues of food security and environmental sustainability were promoted through conferences, papers and panels. The Russade project produced teaching materials dedicated to the dissemination of several fundamental concepts of environmental themes and of sustainable development, considered in an integrated vision (AA.VV., 2017b; Semita, 2017).

Some concepts, which form the basis of the Russade project and the Master project and which can affect the everyday life of the whole population on aspects of public health, environmental protection and food security, have also been disseminated to a wider public and, in particular, to schoolchildren.

For this reason verbal communication has been integrated with images, developing posters that have highlighted explicit and implicit concepts often interconnected. Practical and interactive activities, as well as simple experimental activities, have been implemented using these same posters (Ferrero and Semita, 2016; Ferrero *et al.*, 2016).

The Cisao team connected with Nigerien organizations engaged in rural areas, involved in sanitation or waste disposal, with the aim of creating synergies to raise awareness of their target audience during their interventions.

Periodic meetings for officials from different ministries and heads of NGOs and other institutions were held for informative seminars on the objectives and themes addressed by the project.

Seminars with groups of primary and secondary school teachers identified problematic aspects of the school environment, requiring interventions to raise awareness and encourage students to change their behavior. Between these, the problem of waste disposal, lack of personal hygiene, incorrect or insufficient feeding (Table 3).

| Poster title | Authors |
|--|------------------------------------|
| Protected areas: a resource for Africa | Riccardo Fortina& Giovanni Mortara |
| The bees for man and the environment | Marco Porporato |
| Friendly microbes and wicked germs in food | Roberto Ambrosoli |
| Why we must eat fruits and vegetables | Gabriele Beccaro |

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| Protecting the environment by valuing the plastic waste | Maria Paola Luda |
| ONE HEALTH | Daniele DeMeneghi |
| DOGSVILLE: a table game to learn about rabies and dogs | Daniele De Meneghi |
| Use of agricultural residues to control deforestation | Stefano Bechis |
| Water is a precious resource: it must be correctly used and protected | Sabrina Bonetto& Manuela Lasagna |
| Good hygiene = Good health = Better future perspectives | TizianaNervo& Gabriella Trucchi |

Table 3 –Dissemination material produced by the project.

To meet the needs of the schools, in collaboration with the Directorate of Human and Social Affairs of the Niamey City Council, the Nigerien NGO Eadpd (En avant pour un Développement Propre et Durable / Forward for a Clean and Sustainable Development), well experienced in the field of malnutrition and sanitation, was selected to carry out an educational intervention in five educational establishments in the Urban Community of Niamey on the theme of good hygiene and sanitation practices, waste management, gardening. A number of teachers, pupils, parents of students and even food and water vendors in schools have been identified as beneficiaries of awareness-raising and training activities (Trucchi *et al.*, 2017).

The reports provided by the NGO charged of the above mentioned actions show that the teachers participated enthusiastically in the activities. Moreover, the NGO Eadpd demonstrated a great commitment in the accomplishment of tasks. From the experience emerged a need for training in certain topics such as renewable energies and other aspects of environmental sustainability (impact of individual behaviors, management and mitigation of environmental risk, etc.). It would therefore be desirable that universities and scientists be more open to the outside world, in the perspective of making knowledge available to the community.

Within schools, change should be visible in the short term if teachers become active and responsible actors, capable of transmitting their achievements within school communities and of controlling the health situation.

This awareness might raise a change in behavior and mentality capable of improving the state of health and living environment and, in the long term, induce a reduction in infant mortality.

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Evaluation of the project activities

The involved partners considered the collaboration developed with the teachers as an opportunity to exchange experiences and to strengthen the capacities of each institution, very fruitful in terms of supply planning and didactic methods. The integration of several professors into the modules of the Master, which was one of the main innovative elements of the project, proved to be an asset in terms of enriching the formative offer as well as strengthening the skills of the engaged professors. According to the questionnaires administered to teachers, sharing planning and implementation of didactic units was identified as an opportunity for skills building and a positive dynamic between the involved institutions. In conclusion the collaboration between teachers in the same didactic module was very well evaluated and considered an opportunity of the project (Mola, 2015; 2016; 2017).

Another indicator of the quality of relationships is the fact that all partners are motivated to re-propose the experience in order to make this Master a permanent part of the didactic offer of the different institutions and they even aspire to complete it with a path of Doctorate.

Final considerations

The Master, the main outcome of the project, proposes a didactic program that meets the priorities of the target countries by working on the development of local solutions, enhanced by collaboration with the Northern partner, which adds value in terms of expertise and innovation.

The well-established network between the partners activated a spontaneous process of shared participation and co-participative collaboration that allow the joint development of programs and projects to be submitted to different international and national calls.

The approach developed in the project aims to emphasize the links between learning, research and professional practice and to open new perspectives: the capacity to face problems in a systemic way in different contexts and to acquire professional skills to work on different environmental components, in compliance with the fragile and complex natural balances is in accordance with the overview adopted by the United Nations in the elaboration of the Sustainable Development Goals of the 2030 UN Agenda for Sustainable Development that cover the three dimensions of sustainable development (economic growth, social inclusion and environmental protection). These elements are

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interconnected and all are crucial for the well-being of individuals and societies and they should be harmonized to achieve sustainable development.

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List of acronyms

| | |
|---------|---|
| ACP | African, Caribbean and Pacific Group of States |
| UE | European Union |
| Agrymet | Centre Régional de Formation et d'Application en Agro météorologie et Hydrologie Opérationnelle |
| Cames | Conseil Africain et Malgache pour l'Enseignement Supérieur |
| Cisao | Centro Interdipartimentale di Ricerca e Cooperazione Tecnico Scientifica con l'Africa |
| Coopi | Cooperazione Internazionale |
| Cresa | Centre for Specialized Education in Agriculture |
| Eadpd | En Avant pour un Développement Propre et Durable |
| Fao | Food and Agriculture Organisation |
| Fed | Fonds Européen de Développement |
| Gred | Groupe de recherche action pour l'éducation au développement |
| HEI | Higher Education Institutions |
| Ifad | International Fund for Agricultural Development |
| Insta | Institut National de Sciences et Technologies of Abéché |
| Itrad | Institut Tchadien de la Recherche Agronomique pour le Développement |

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| Lernse | Laboratoire d'Études des Ressources Naturelles et des Sciences de l'Environnement Université Polytechnique de Bobo Dioulasso |
| Lmd | License, Master, Doctorate |
| NGO | Non-Governmental Organization |
| Pnag | Programme National d'Amélioration Génétique des bovins locaux |
| Russade | Réseau des Universités Sahéliennes pour la Sécurité Alimentaire et la Durabilité Environnementale |
| Sdgs | Sustainable Development Goals |
| UN | United Nations |

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