

Professor of research in Geography/Ethnobiology at CNRS

My field of research can be defined by two themes: the relationships between humans and habitats, and agrobiodiversity. I analyze how the two components of the biodiversity concept, cultural and biological interact and how they constitute an adaptive potential for societies exposed to faster and faster global changes.

KEY-WORDS

Disciplines: Cultural geography / Ethnobiology.

Countries: Vanuatu / Amazonia (Brazil, Peru and Ecuador) / Colombia.

Methods: Participant observations, surveys, social network analysis

Key-words: agrobiodiversity, social network analysis, seed circulation, biocultural indicators, biocultural interactions, *in situ* conservation, land tenure, resilience, informal seed system, vegeculture.

EDUCATION AND AWARDS

2001-05: Doctorate in Geography. Towards a dynamic conservation of agrobiodiversity: local management of varietal diversity of a « white man's » tree (coconut tree) and a plant « of the ancestors » (taro) in Vanuatu.

Université d'Orléans – Under the direction of Dr. Jean-Paul Lescure (Ethnobotanist, IRD).

2004: First Prize in the Young Researchers competition organized by the French Institute of Biodiversity (IFB).

1999-00: DEA Environment, Time, Space, Societies. Option in Environment and Society.

Université d'Orléans and IRD d'Orléans.

1997-99: AGRONOMY ENGINEER. Option in Management, Economy, and Communication.

Ecole Nationale Supérieure Agronomique de Toulouse (ENSAT).

1996-97: MASTERS in Biology of Populations and Ecosystems. Option in Conservation Biology.

McGill University (Canada) in exchange with the Université ParisXI.

1993-96: DEUG and Degree in Biology. Options in Mathematics and Ecology.

Université Paris XI.

RESEARCH THEMATICS

1. Adaptation to socio-environmental changes: Resilience or the adaptation of human beings to socio-environmental changes is a transversal thematic to all my projects. I am answering the questions: how the interactions between cultural and biological diversities could constitute an adaptation potential for societies confronted to quicker and more globalized changes? How societies in close relation with their environment use, transform, invent and transmit their knowledge in relation with extreme climatic events such as cyclones or tidal waves?

2. Social network analyses and seed systems: The analysis of seed exchange networks can reveal new relations between societies and biodiversity. My main question is: how the structure of seed circulation networks impacts the agrobiodiversity, including the genetic diversity? And more precisely: What is the influence of human migration histories and the biocultural properties of plants on seed circulation networks? Seed circulation is analyzed thanks to statistical analysis of social networks and theoretical models thanks to collaborations with mathematicians and modelers. I am trying to better integrate qualitative and quantitative approaches to respond to questions in social and human sciences.

3. Agrobiodiversity, local knowledge and innovation: I am questioning the interactions between the two components of the concept of biodiversity, the cultural and biological diversities, in order to

describe local knowledge and practices of small-scale agriculture. I am trying to describe and understand the complexity of agrobiodiversity by answering to the questions: How are farmers creating their knowledge and how can they adapt their practices to a changing world? How the complex knowledge-practice impacts the diversity of crops? And reciprocally how the information (nomenclature, classification, uses, and origin) collected on plant can inform about the society, its organization and reproduction? I am underlining the fundamental links between the person, the place and the plant.

RESEARCH PROJECTS

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
MAN										
	TANZ									
		PLANTADIV								
		MIGRAVAN								
			USART							
			GDR MOSAIQUE 1				GDR MOSAIQUE 2			
				NetSeed						
				GESTRAD						
					ECOPAS					
					MIRES 1			MIRES 2		
								MADRES		
								PAIX		
								NSF-CNIC		
									NCEAS-SNAPP	

Table: Calendar of my research projects.

2016-2018 Assessing Biocultural Indicators of Community Resilience (NCEAS-SNAPP)

Lead researchers: Tamara Ticktin (Ethnobiologist, University of Hawaii), Stacy D. Jupiter (Marine biologist, Wildlife Conservation Society), Manuel Mejia (Marine biologist, The Nature Conservancy), and Eleanor Sterling (Ecologist, American Museum of Natural History, NYC).

Financing: U.S.-based National Center for Ecological Analysis and Synthesis (NCEAS) - Science for Nature and People Partnership (SNAPP)

Biocultural feedbacks are widely believed to play a critical role in fostering resilience of both human and ecological communities, but they are poorly understood. Through synthesis of the literature and comparative data analyses from on-going projects across a wide range of Pacific Island communities, we will identify (i) What makes a good biocultural indicator and how can it be measured?; (ii) How can we scale local to global indicators and which have relevance across Pacific Island sites?; and (iii) What is the relationship between pressures, 'biocultural state', benefits and management responses in Pacific Island communities?

2015-2017 *US-Pacific Islands planning visits: Conceiving biocultural resilience with Pacific island communities: bridging disciplines, language, and culture (NSF-CNIC).*

Lead researchers: Eleanor Sterling, Christopher Filardi (Ecologist, American Museum of Natural History, NYC) and Jennifer Newell (Anthropologist, American Museum of Natural History, NYC).

Financing: U.S.-based National Science Foundation (NSF) - Catalyzing New International Collaborations (CNIC)

This project aims to unite disparate research groups and local communities to better understand and manage Pacific Island system resilience in the face of pending large-scale disturbances such as climate change and increasing market pressures. This collaborative project is designed to bring together individuals and communities across three existing gaps: those between cultural and geographic boundaries in the Pacific, biological and social scientists, and scientists and local communities. This project plans to develop "biocultural resilience indicators" that are academically rigorous while also feasible to implement for decision making by communities faced with imminent social, economic, and ecological disturbances.

2015-2017 *PAthogen-Informed sustainable resistance of cassava against Xanthomonas (PAIX).*

Lead researcher: Boris Szurek (Geneticist, IRD).

Financing: Agropolis Fondation

Worldwide, a bacteria *Xanthomonas* is devastating cassava cultures. In our work package, the objectives is to identify farming practices (intra- and inter-species diversities, species organizations in time and space, socio-economical contexts) that ease the propagation of the disease in Colombia. We question the impacts of seed circulation networks on the disease diffusion (epidemiology and genetic diversity, cf. Christian Vernière, CIRAD) and on the varietal diversity of cassava (named and genetic diversity, cf. Anne Duputié, University of Lilles).

2015-2016 *Modeling and analysing dynamics within seed exchange networks (MADRES)*

Lead researcher: Samuel Martin (Computer scientist, University of Lorraine)

Financing: Project PEPS MoMIS (CNRS)

Biodiversity is largely impacted by seed exchange networks. MADRES aims both to better understand the formation of seed exchange networks and understand their impact on the development of agrobiodiversity. The interdisciplinary consortium of researchers in social sciences and statistical experts and network modelers in dynamic systems work in two complementary areas: (i) formulation of generative models of graphs to represent the seed flow; (ii) the development of networked dynamical systems to model the evolution of seed selection by farmers. Numerical simulations and theoretical analysis will enable a predictive understanding of models.

2012-2013 *Interdisciplinary Methods for Networks of Seed Exchanges (MIRES).*

Lead researchers: François Massol (Modeler, CNRS), Sophie Caillon (Ethnobiologist, CNRS), and Pierre Barbillon (Statistician, AgroParisTech)

Financing: Department Applied Mathematics and Informatics (INRA), RNSC (National Network of Complex Systems). Renewable project.

MIRES focuses on the flow of seeds between farmers, a process that represents the principal source of genetic diversity in agro-ecosystems. This project seeks to develop multi-level models and methods of analysis in order better to understand the social dynamics inherent in the flow of seeds and their impacts on agrobiodiversity.

2011-2014 *Agrobiodiversity and social networks. An interdisciplinary method to analyze how local systems of seed banks affect the diversity of domestic plants (NetSeed)*

Lead researchers: Doyle McKey (Ecologist, University of Montpellier) in collaboration with Sophie Caillon (Ethnobiologist, CNRS) and François Massol (Modeler, CNRS).

Financing: Center of Synthesis and Meta-analysis on (CESAB) of the Foundation for Research of Biodiversity (FRB).

The flow of seeds can weaken local adaptation by introducing inappropriate species or varieties, or strengthen systems of culture by making them more adaptable to change. Through a meta-analysis of data, we study the networks of seed exchange (SEENs) between farmers to determine how this structure – meaning, direction and intensity of flow, and the distribution of genealogical, sociocultural, or geographic distance between implicated individuals or social entities – influences agrobiodiversity. We also examine how this structure interacts with socio-economic factors.

2012-2015 *European Consortium for Pacific Studies (ECOPAS).*

Lead researchers: Professor Edvard Hviding (Anthropologist, University of Bergen) and Laurent Dousset (Anthropologist, EHESS)

Financing: European project _ Coordination and support action _ FP7-SSH-2012-2.

The objective of this project is to create an easily accessible online platform bringing together information about resources (publications, media, etc.), researchers and their expertise, and associations and other groups. This platform is designed not only for researchers but also for all other local actors interested in and working on the causes and consequences of climate change in the South Pacific.

2010-2013 *Research Group « Agroecosystems, Agrobiodiversities and Environment, Domestication and Innovations » (MOSAÏQUE 3353)*

Lead researcher: Yildiz Aumeeruddy-Thomas (Ethnobiologist, CNRS).

Financing: Institute for Ecology and Environment (INEE)

The objective of this research group is to explore the social, historical, biological, and political processes that have contributed in shaping agroecosystems and their agrobiodiversity. Using a diachronic perspective which allows a unique understanding of the durability, resilience, and innovations underlying the relations between societies and agrobiodiversity, the research group contributes to a better understanding of social – environmental relations.

2011-2014 *Sustainable management of marine resources: towards a better engagement of traditional populations in Vanuatu (GESTRAD)*

Lead researcher: Sophie Caillon in collaboration with Marc Leopold (Ichthyologist, IRD).

Financing: Fonds Pacifique and Ambassade de France of Vanuatu.

The objective of this project is to contribute to the definition of a national fisheries policy, and to improve the participation of village communities in defining these regulations. A regional workshop will promote exchange of information between Vanuatu (Cultural Center, Departments of Fisheries and Environment) and neighboring countries.

2010-2014 *From the ancient to the Modern? Transmission of practice, knowledge, and representations of territory in the Brazilian (USART)*

Lead researcher: François-Michel Le Tourneau (Geographer, CNRS).

Financing: Agence nationale de la recherche (ANR) « Young Researchers »

Before the advance of deforestation and its negative consequences (local and global climate change or biodiversity loss, etc.), it is necessary to encourage the maintenance of "traditional populations" Amazon in the spaces they live. What are the essential properties and functions of plants and knowledge associated with the territory which are preserved and what practices / performances that

reflect a break in the modes of articulation in space? Our project is to study how that knowledge, which are largely the originality of these companies are transmitted and transformed.

2008-2012 *Evolution of the diversity of genetic domesticated resources in the Lake Chad Basin (Plantadiv)*

Lead researcher: Eric Garine (Anthropologue, Université Paris IX).

Financing: Agence nationale de la recherche (ANR) programme « Biodiversité ».

When disturbances, how are reorganizing agropastoral systems in Sudano-Sahelian region which are based on complementarity between inter- and intra-specific diversities? The objectives of this project are (i) to characterize agricultural biodiversity maintained in agro-ecosystems of the Lake Chad basin, (ii) to understand its evolution under the impact of social and environmental changes in the twentieth century. Within this project, I am particularly interested in the evolution of biennial rotations that Mafa and Xide farmers have developed for centuries in the Mandara Mountains (North Cameroon).

2009-2010 *Environmental and social impact of migrants on a South Pacific island (MIGRAVAN)*

Lead researcher: Sophie Caillon in collaboration with Patrick Heuret (Botanist, INRA) and Hervé Bohbot (Geographer, CNRS).

Financing: conseil scientifique de l'Université Montpellier2.

By investing a "virgin" territory, migrants disrupt an ecosystem, and introduce immaterial or materials, natural or manufactured objects. If they do not come in competition locally, these objects are involved in the transformation of cultural and biological diversities. What are the environmental and social impacts caused by inter-island human migration in Vanuatu? To answer this question, we 1. identify the nature of transported plants (agricultural or forest resources) during migration, and 2. analyze the treatment (use, perception, representation) of the invested space.

2007 *Local management of cassava in Vanuatu (Tanna island) (MAN)*

Lead researcher: Doyle Mckey (Ecologist, University of Montpellier) in collaboration with Sophie Caillon (Ethnobiologist, CNRS).

Financing: Prix d'Ethnobotanique Yves Rocher-Institut de France (2006).

The objective of this project is to compare the evolutionary dynamics of the diversity of cassava from its original area (case study in French Guyana and Guyana) and the more recently introduced areas (Gabon and Vanuatu). By linking practice and diversity in each of these areas, it is hypothesized that Vanuatu can be understood in light of what has happened in countries where cassava was introduced long time ago.

2005-2009 *Migration and agrobiodiversity in the Rufiji valley in Tanzania (TANZ)*

Lead researcher: Stéphanie Duvail (Geographer, IRD).

Financing: Program « young-researchers » from the Institut Français de la Biodiversité (IFB).

In a context of short time (marked by seasonal floods and rains, population displacements during the Ujumaa) and long time (disruption of seasonality) changes, the team of young researchers composed of geographers, ethnobiologists, economists and lawyers are dealing with migration experiences of the Rufiji populations. Specifically, I am interested to farmers coping strategies for their choice of the cultivated ecosystems, planting period and biological materials.

2001-2005 *Towards a dynamic conservation of agrobiodiversity: Locally managing the varietal diversity of a tree "from the Whites" (coconut, *Cocos nucifera* L.) and of a plant "from the ancestors" (taro, *Colocasia esculenta* (L.) Schott) in Vanuatu*

Directeur de thèse : Dr. J.-P. Lescure (Ethnoecologist, IRD).

Financing: bourse de la région Centre, IRD and CIRAD.

The varietal diversity of coconut and taro in an isolated village from Vanuatu are identified using tools from agronomy, anthropology, genetics and geography. The result of this interdisciplinary work suggests that its validation, both from the local as well as scientific points of view, depends not only upon the social relationships with the plants, which have been shaped by their biology and their history, but also upon the purposes for which they are intended, namely, to preserve a cultural diversity, a phenotypic variability, an evolutionary potential and the place's memory through ancestral links. The contrasting examples of the taro (a socially valued object, cultivated on land inherited "from the ancestors", and linked to an important cultural diversity and a narrow genetic-base) and the coconut (a socially valued object, planted in a crop space at the prompting of "the Whites" and genetically diverse despite few named categories) demonstrate that the same farmers make up a society that, through its management of taro, affirms traditional ecological knowledge, and all the while participates in a market economy by intensifying its crop of coconuts. This thesis illustrates that the integration of cultural and biological diversity into the biodiversity concept can lead to contradictions if this knowledge, reduced to simple formulae, is abstracted from its cognitive and socio-cultural settings. In questioning the feasibility of in situ conservation and participatory plant breeding politics, it underlines that an interdisciplinary approach is necessary to optimize the effectiveness and conciliation of conservation and development programs for subsequent populations that are confronted with globalisation processes.

PUBLICATIONS

Peer-reviewed journals

1. Thomas M. & **Caillon S.** (2016). Effects of social status of farmers and biocultural value of plants on seed circulation networks in Vanuatu. Ecology and Society.
2. Thomas M., Verzelen N., Barbillon P., Coomes O.T., **Caillon S.**, McKey D., Elias M., Garine E., Raimond C., Dounias E., Jarvis D., Wencélius J., Leclerc C., Labeyrie V., Cuong P.H., Hue N.T.N., Sthapit B., Rana R.B., Barnaud A., Violon C., Reyes L.M.A., Moreno L.L., De Santis P., Massol F. (2015). Chapter Six - A network-based method to detect patterns of local crop biodiversity: validation at the species and infra-species levels. In: Guy, W., David, A.B. (Eds.), Advances in Ecological Research. Academic Press, 53: 259-320.
3. Coomes O., McGuire S., Garine E., **Caillon S.**, McKey D., Demeulenaere E., Jarvis D., Aistara G., Barnaud A., Clouvel P., Emperaire L., Louafi S., Martin P., Massol F., Pautasso M., Violon C. & Wencélius J. (2015). Farmer seed networks make a limited contribution to agriculture? Four common misconceptions. Food policy 56: 41-50.
4. Leopold M., Beckensteiner J., Kalatavara & **Caillon S.** (2013). Community-based management of coastal fisheries in Vanuatu: what works? Marine Policy 42: 167-176.
5. Pautasso M., Aistara G., Barnaud A., **Caillon S.**, Clouvel P., Coomes, Delêtre M., Demeulenaere E., De Santis P., Döring, Eloy L., Emperaire L., Garine E., Goldringer I., Jarvis D., Joly H.I., Leclerc C., Louafi S., Martin P., Massol F., McGuire S., McKey D., Padoch C., Soler C., Thomas M., Tramontini S. (2013). Seed exchange networks for agrobiodiversity conservation. A review. Agronomy for Sustainable Development, 33(1): 151-175.
6. **Caillon S.** & Coomes O.T. (2012). Agriculture traditionnelle et fleurs coupées: un mariage réussi en Amazonie. Journal des anthropologues, 128-129: 85-114.
7. **Caillon S.** (2011). Ethnobotanique du cocotier (*Cocos nucifera* L.) sur l'île de Vanua Lava (Vanuatu), Journal de la Société des Océanistes 133: 333-352.

8. Le Tourneau F.-M., **Caillon S.**, Eloy L., Greissing A., Kohlers F., Marchand G. & Nasuti S. (2008). "Géographie et anthropologie. Deux regards complémentaires pour l'étude des territoires des populations traditionnelles d'Amazonie brésilienne" EchoGéo 7 (Sur le Métier – Hommage à Claude Lévi-Strauss), <http://echogeo.revues.org/index9853.html>.
9. **Caillon S.** & Degeorges P. J. (2007). Biodiversity: negotiating the border between nature and culture. Biodiversity and Conservation, 16(10): 2919-2931.
10. **Caillon S.** (2007). Arbre d'antan, arbre « des Blancs ». Evolution de la valeur sociale des cocotiers et de leur espace à Vanua Lava (Vanuatu). Géographie et Culture « Médiante et Géographicité », 63: 87-104.
11. **Caillon S.**, Quero-García J., Lescure J.-P. & Lebot V. (2006). Nature of taro (*Colocasia esculenta* (L.) Schott) genetic diversity prevalent in a Pacific Ocean island, Vanua Lava, Vanuatu. Genetic Resources and Crop Evolution 53(6): 1273-1289.
12. **Caillon S.** & Lanouguère-Bruneau V. (2005). Gestion de l'agrobiodiversité dans un village de Vanua Lava (Vanuatu): stratégies de sélection et enjeux sociaux. Journal de la Société des Océanistes, 120-121(1): 129-148.
13. **Caillon S.** & Degeorges P. (2005). Biodiversités, quand les frontières entre culture et nature s'effacent.... Ecologie & Politique, 30: 85-95.
14. **Caillon S.** (2005). Les taros du Vanuatu: Que conserver et comment? Nature Sciences et Sociétés, 13(3): 306-310.
15. **Caillon S.**, Quero-García J. & Guarino L. (2004). Taros in Vanuatu: toward a dynamic conservation strategy. Low External Input and Sustainable Agriculture, 20(1): 18-20.
16. Labouisse J.-P. & **Caillon S.** (2001). Une approche de la conservation *in situ* par l'étude d'un système semencier informel : cas du cocotier au Vanuatu (Pacifique Sud). Oléagineux Corps gras Lipides, 8(5): 534-539.

Book chapters

1. **Caillon S.** & Muller S. (2015). Géographie et savoirs locaux : pour une conservation dynamique de l'agrobiodiversité au Vanuatu, in Mathevet R. & Godet L. (eds.) Pour une géographie de la conservation. Biodiversités, natures et sociétés. L'Harmattan, Paris. 400p : 209-227.
2. **Caillon, S.** 2015. Exemple 5.2 Diversité bioculturelle des systèmes horticoles au Vanuatu. In In Ronce O. & Pelegrin F., Réponses et adaptations aux changements globaux : quels enjeux pour la recherche sur la biodiversité ? Prospective de recherche. Série FRB, Réflexions stratégiques et prospectives, Paris : 38-39.
3. **Caillon S.** & Claudet J. (2014). Quand la nature nous rend service in Forget P.M., Hossaert-McKey M. & Poncy O. (eds.) L'Ecologie Tropicale, CNRS - Cherche-Midi: 144-163.
4. Eloy L., Le Tourneau F.-M., Nasuti S., **Caillon S.**, Kohler F., Marchand G., & Greissing A. (2013). Collectif ou individuel ? Territoire & patrimoine chez les *quilombolas* d'Amazonie orientale. In D. Juhé-Beaulaton, M.-C. Cormier-Salem, P. de Robert. & B. Roussel (éds.), Effervescence patrimoniale au Sud. Entre nature & société. Editions de l'IRD, coll. Latitudes 23, Marseille: 199-225.
5. Garine E., Luxereau A., Wencelius J., Violon C., Robert T., Barnaud A., **Caillon S.**, & Raimond C. (2013). De qui les variétés traditionnelles de plantes cultivées pourraient-elles être le patrimoine ? Réflexions depuis le Bassin du Lac Tchad. In D. Juhé-Beaulaton, M.-C. Cormier-Salem, P. de Robert. & B. Roussel (éds.), Effervescence patrimoniale au Sud. Entre nature et société. Editions de l'IRD, coll. Latitudes 23, Marseille: 379-410.
6. **Caillon S.** (2012). Produce to exchange. The taro water-gardens on Vanua Lava (Vanuatu), a social and sustainable place, in Matthew Spriggs, David Addisson & Peter J. Matthews (eds.) Irrigated taro (*Colocasia esculenta*) in the Indo-Pacific. Biological, social and historical perspectives. Senri Ethnological Series 78, National Museum of Ethnology, Osaka, Japon.: 189-208.
7. **Caillon S.** Participation (2 photos and their legend) to the book Hommes et natures, People and natures (2012), edited by Motte-Florac E., Aumeeruddy-Thomas Y., Dounias E., Seres humanos y naturalezas. IRD, Marseille, 175 p.

8. Kohler F., Eloy L., Le Tourneau F.-M., Couly C., Nasuti S., Serges D., **Caillon S.**, Marchand & G. Greissing A. (2011). Globalization in the Amazon Region: conflicting answers from « Quilombo » communities. In P. Pachura (ed.) New Knowledge in a New Era of Globalization, Rijeka, Croatia, Intech Open Access, chap. 14, pp. 269-284.

Booklets

1. **Caillon S.** (2004). Kokonas mo taros blong Vanuatu: nem mo storian. IRD, Orléans, 70p.
2. **Caillon S.** & Malau E.F. (2002). Coconuts and taro from the West Coast of Vanua Lava (Vanuatu): an ethno-agronomic inventory. IRD, Orléans, 30p.
3. **Caillon S.** & Malau E.F. (2002). Kokonas mo taros blong weskos Vanua Lava : wan katalog. IRD, Orléans, 49p.

Dissertations

1. **Caillon, S.** (2005). Pour une conservation dynamique de l'agrobiodiversité: gestion locale de la diversité variétale d'un arbre « des Blancs » (cocotier, *Cocos nucifera* L.) et d'une plante « des ancêtres » (taro, *Colocasia esculenta* (L.) Schott) au Vanuatu. PhD of Geography–Management–Environment. Orléans, Université d'Orléans, Orléans: 419p. (+272p. annex).
2. **Caillon S.** (2000). Stratégies d'échange et diversité variétale du manioc: leurs interactions chez trois ethnies équatoriennes. DEA Environment, Time, Space and Societies, Université d'Orléans, Orléans: 119p.
3. **Caillon S.** (1999). Agriculture traditionnelle et fleurs ornementales un mariage réussi en Amazonie. Engineer school in Agronomy, ENSAT, Toulouse: 56p.