Foreword

The year 2015 is marked by a series of events related to climate change. This priority issue is covered at the *Salon International de l'Agriculture in Paris* (February), the third Global Science Conference on Climate Smart Agriculture in Montpellier (March) and at the UNESCO* Our Common Future under Climate Change Conference (July), which will provide an occasion for the scientific preparation of the 21st session of the Conference of the Parties to the UNFCCC** in Paris (December). Climate change will also be a focus of concern at the 3rd UNCCD*** Scientific Conference taking place at Cancún, Mexico in early March. As the laboratories and research organizations established in Languedoc-Roussillon Region are recognized—via the high level of their publications—as the leading French scientific research community in the fields of agronomy, environment and biodiversity, we felt they warranted contribution to this year's discussions and debates through a publication presenting their teams and research. This 20th *Dossiers d'Agropolis International* issue regarding impact and adaptation to climate change showcases the work of this community!

Research units constituting the Agropolis scientific community, representing French and foreign institutions, conduct highly multidisciplinary research using integrated approaches that are particularly relevant with regard to agriculture and natural resources issues. They participate in many national and international networks, associations and learned societies, all of which offer them a top quality scientific environment for developing these approaches. The regional scientific community therefore has the expertise and tools necessary to contribute to the assessment of climate change impacts and associated adaptation needs.

The 5th IPCC**** Report is in line with the previous findings of the Panel, confirming their conclusions and strengthening the hypotheses, which are no longer seriously questioned—global warming is now an established fact and an unprecedented number of associated changes have already been observed. These changes have profound direct and indirect impacts, raising critical concerns for human societies. The preservation and evolution of our resources remain in question and a focus of considerable apprehension. Alongside these profound changes, societies are tapping often already degraded and weakened ecosystems to an increasing extent. The development trajectories have thus placed populations or activity sectors in situations of high vulnerability regarding climate change and its impact on agricultural activities, ecosystems and natural resources.

Hence, it is not so much climate change processes *sensu stricto* that are studied here, but rather their effects on the environment and production systems. The aim is to be able to foresee future changes and design intervention methods or adjustments to be made in order to avoid unwanted situations, according to the concept of 'adaptive management'.

This might lead one to think that the issue is essentially approached from an adaptation perspective, suggesting that there is no place for mitigation approaches. However, scientific reasoning does not differentiate these two aspects of the same issue—contrary to political debates that confront them for strategic purposes without any connection with the reality of the phenomenon. When, for instance, studying livestock farming systems, are we not concerned with both mitigation and adaptation?

This *Dossier* is organized in four main sections that address issues from a systemic standpoint. The first part is focused on the preservation and use of resources at territorial management scales—functioning of aquatic systems and watersheds, water uses, the role and status of forest areas, observation and information platforms, social forms and conditions of territorial and resource governance. The second part deals with ecosystems and the biodiversity that sustains their functionality. This pertains to continental ecosystems, studied using current or past indicators in order to assess their dynamics, as well as the marine environment—both coastal and pelagic—from fish populations to phytoplankton elements. The next part deals with the question of interactions within the 'host organisms–pest, parasite/pathogen or symbiotic organisms–environment' triad, including monitoring and control methods based on modelling of these interactions and design of new practices aimed at reducing risks induced by new dynamics associated with climate change. Finally, the last part is devoted to agricultural and livestock production, from genetic research to studies on landscape dimensions, so as to view production systems from a broader scope, thus leading to a better overall understanding of the processes under way and to proposals for action.

This overview confirms the importance of developing integrated approaches, from functional biology dimensions to approaches on territorial scales, while relying substantially on observations, experiments and modelling so as to gain a clear overall understanding of the processes involved and to act with discretion to mitigate and adapt to them.

Enjoy reading this directory of expertise in which abundant useful references and addresses can be found to fulfil everyone's needs and expectations. It is also hoped that this *Dossier* clearly illustrates the high extent of mobilization of our scientific community to address the challenges of climate change currently under way.

Bernard Hubert,
President of Agropolis International

* United Nations Educational, Scientific and Cultural Organization
** United Nations Framework Convention on Climate Change
*** United Nations Convention to Combat Desertification
**** Intergovernmental Panel on Climate Change