

GAINING RIGHTS TO CITIZENSHIP:
THE PRESENCE OF SOCIAL SCIENCES IN AGRICULTURAL
RESEARCH AND THE GLOBAL PROGRESS
OF “CONSERVATION AGRI-CULTURE”

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Nota Redacției: Acest articol este contribuția originală a Profesorului Amir Kassam la sesiunea Științifică internațională organizată în onoarea Profesorului Mihail M. Cernea, membru corespondent al Academiei Române, care a avut loc în zilele de 27–29 mai 2011, la Castelul Bieberstein (Dresden-Saxonia) din Germania. Sesiunea a fost organizată de un Comitet Internațional compus din Dr. Scott Guggenheim (USA/Indonezia), Dr. Maritta R. von Bieberstein Koch-Weser (Germania/Brazilia), președinta organizației „EARTH 3000”, și Prof. William Partridge (USA/Columbia). La sesiune au participat sociologi, antropologi, economiști, precum și oameni de știință reprezentând alte domenii, din Africa de Sud, Anglia, Australia, Brazilia, China, Columbia, Egipt, Elveția, Germania, India, Indonezia, Norvegia și Statele Unite, care au prezentat studii originale dedicate contribuțiilor științifice ale profesorului Mihail Cernea în domeniul sociologiei și antropologiei sociale. Profesorul Amir Kassam a supus acest articol *Revistei Române de Sociologie* pentru publicare anticipată în România. Autorul evocă, pe de o parte, activitatea sociologului român Mihail Cernea în calitatea sa de membru reprezentant al științelor sociale în Consiliul Științific al Consorțiului Internațional al Institutelor de Cercetări în Științele Agricole (CGIAR), și, pe de altă parte, comentariile comunității sociologice internaționale.

Exprimăm mulțumirile noastre Profesorului A. Kassam și organizatorilor sesiunii Bieberstein pentru posibilitatea de a publica acest articol cu prioritate, înaintea tiparirii întregului volum cu lucrările sesiunii omagiale, programat să apară în anul 2013.

ABSTRACT

This article first presents reflections on the joint work carried out by Michael Cernea and this paper's author over 8–9 years for gaining “room, recognition and resources” within the CGIAR¹ for sociological and socio-anthropological research on farmers, their practices and needs.

The status of social research inside the CGIAR has gone through ups and downs in the uphill battle for expanding social research within this organization. Social scientists have constantly worked to feed their findings into the Centers' biophysical research. The paper documents the contribution of Michael Cernea, the first sociologist who acceded to CGIAR's top science and policy bodies, to

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strengthening the presence and influence of sociological and anthropological knowledge within CGIAR's institutional architecture and scientific products.

The second part of this study presents the high promise of *Conservation Agriculture (CA)* – a new paradigm for non-tillage agricultural production that offers improved productivity and environmental protection. CA principles are universally applicable. The author offers global data on the impressive advances and distribution of CA, which covers already some 125 million ha distributed across all continents and agro-ecologies. CA is a farmer-driven socio-cultural phenomenon which has expanded at a yearly rate of 7 mil. ha during the past decade.

Keywords: social research, sustainability, paradigm, sociology, anthropology, degradation.

The book *Fifty Key Thinkers on Development* (Bebbington, 2006) quoted Michael Cernea describing to his students the challenges and attraction of applying social sciences to development by using a metaphor: development sociology and anthropology, he is warning them, are “**a contact sport**”ⁱⁱ: practicing sociology and anthropology demands “*people who have not only brains but who can and want to fight; people who have not knowledge alone, but also have convictions; and people whose anthropological knowledge is accompanied by a moral dimension*”.

I had the privilege of working closely for several years with Michael Cernea and saw first-hand what the spirit of a militant “contact anthropologist” can be all about. This article will share my reflections on our joint work over 8–9 years in CGIAR, during which we battled for gaining recognition for the *culture* embedded in *agri-culture as a legitimate object of social science research* and for getting the member Centers of CGIAR to carry out sociological research on farmers, their production systems, households, communities, and institutions. After that period, our work paths separated, but our connection stayed alive: on my side, I tried to continue applying some of the approaches the two of us had advocated within the new work-area that I chose for myself after leaving the CGIAR: this is the high-promising challenge of expanding globally what is defined as *Conservation Agriculture (CA)* (see part 2 of this paper).

In line with these two periods, this paper has two parts: the first sums up our joint activities in the CGIAR (Consultative Group on International Agriculture Research), while the second brings into this volume some largely new information on the emerging domain of CA as a base of agricultural transformation that is increasingly gathering pace internationally, its importance not only to agriculture and food systems but to global human development altogether. In this second part, I will elaborate – both in sociological and in technical terms – upon the role of Conservation Agriculture which is now increasingly taking root in different continents. I regard this process as potentially becoming a mainstream production and natural resources management strategy for sustainable agricultural production.

1. CHALLENGING THE AMBIGUOUS STATUS OF SOCIAL RESEARCH IN CGIAR

CGIAR was already in existence for more than two decades, when for the first time an eminent sociologist was appointed, in 1998, to its top scientific council: the TAC (Technical Advisory Committee), which later was renamed CGIAR's Science Council (SC). At that time, I was working as a senior staff specialist in the Secretariat of CGIAR's TAC located at FAO (Food and Agriculture Organization of the United Nations) in Rome. This first sociologist did not wait long to take a substantive stand on behalf of his discipline and to become the strongest voice for the social scientists working, in various numbers, in the international research centers gathered under the CGIAR umbrella.

A STRONG VOICE FOR SOCIAL RESEARCH

Cernea came to the CGIAR after a long and brilliant career of almost a quarter century in the World Bank, which earned him the high responsibility of Senior Advisor for Social Policies and Sociology to the Bank's top management. Yet, when he started there in 1974 as that institution's first ever sociologist, the skeptical World Bank brought him in at the bottom rung of its staff structure although, even at that time, he already had a high national and international status as a sociologist specialized in rural societies, in addition to his work in other research areas. Already in 1973, i.e., before being invited to join the World Bank, Europe's rural sociologists had elected Cernea as Vice-President of the European Society for Rural Sociology.

In his country of origin, Romania, Cernea pioneered in the early 1960s the resumption of empirical field-based sociology, a science that initially had been forbidden and excommunicated by the country's socialist regime from the family of "acceptable" areas of science. His pioneering role in that revival had been noticed not only domestically, but internationally as well. Among other things, Cernea also initiated a monographic comparative research on two villages, one of which had been monographed by the Romanian School of Sociology during the 1930s. Cernea organized a team in the mid-60s which comparatively re-monographed the same village, to identify and analyze the structural, social, and technical changes through which the village went over a 35-year period. The book became a landmark: it was the first such comparative research done in Romania and one of the very few of this kind produced in the world at large (Cernea and Chepes, 1970).

Cernea came to the CGIAR with the strong international reputation acquired by working on several of the Bank's most important agricultural programs in Asia and Latin America, particularly on projects disseminating knowledge to farmers through agricultural extension systems and on programs for poverty reduction

through rural development. Most remarkably, however, his tenacity along the years in continuing to write and publish academically the lessons and generalizations he was deriving from his operational work and empirical field research in many countries strengthened also his scholarly status and, from the outset, gave him intellectual authority within the CGIAR scientific community. His numerous studies on rural development theory, practice, and policies were seminal for the then young and evolving domains of development anthropology and sociology. The first book he published while at the World Bank was an instant topical novelty in the Bank's entire published literature up to that moment, drawing worldwide surprised and favorable reviews: it was the well-known volume on *Sociological Variables in Rural Development: Putting People First*, reprinted in two editions (Cernea 1985/1991). Then it was followed by translations from English to other languages across the world: Spanish, Bahasa, Chinese, Japanese, and French. He continued with other studies on "the production of social methodologies for development" (Cernea 1983, 1987), on "sociological frameworks for forestation policies" (Cernea 1992), on the building of farmers' organizations as integral to social development (Cernea 1996), and on many other key topics. Often Cernea's views did not coincide with, or were even critical of, the World Bank's projects and approaches, yet he had the courage of his own opinion and argued them in writing. When once a departmental close colleague belittled in a study the role of social sciences in farming systems research, against Michael Cernea's objections, Michael did not hesitate to prepare a rebuttal article written jointly with his younger colleague and anthropological soulmate, Scott Guggenheim, and went outside the World Bank to publish his critique under the provocative title: "*Is anthropology superfluous in farming system research?*" (Cernea and Guggenheim, 1985).

These activities, as well as Cernea's contributions in framing various development policies and social policies explain why, when he retired from the World Bank, all three major agencies sponsoring CGIAR the UNDP, FAO and the World Bank – unanimously appointed Cernea as a member to CGIAR's top scientific council, the Technical Advisory Committee (TAC). He thus became the first-ever sociologist to receive membership in it in the twenty-year existence of CGIAR. Further, from 2000 onwards, Michael became also an active member in TAC's Standing Panel on Priorities and Strategies (SPPS) led by Alain de Janvry, of which I was the Coordinating Secretary. I worked closely with Michael Cernea throughout his CGIAR tenure on numerous sessions of the TAC and of the SC, and we much intensified our collaboration in 2001–2002 when Michael and I were in charge of preparing and organizing a system-wide conference of the social scientists (non-economists) working in the CGIAR. Michael had initiated that conference by proposing repeatedly its organization until TAC finally agreed. The Conference on Social Research took place at CIAT, in Cali, in 2002, the largest in CGIAR history. Subsequently, I worked with Michael for editing a substantial volume on the status, accomplishments, weaknesses, and future perspectives of

social research in the CGIAR (Cernea and Kassam, 2006). It remains to date the most comprehensive volume about the history and contribution of sociological and anthropological research to the CGIAR system.

It was not difficult for me to feel sympathetic and in-tune with what Michael Cernea was concerned about in TAC because, despite my different scientific background, his arguments always made eminent sense from an agro-ecological viewpoint. Michael acted on his belief that social researchers' mission was to produce knowledge usable as an international public good by and for farming communities. I do not believe that TAC had ever experienced anyone like Michael before. He conceived his role in CGIAR as being the lead militant for promoting non-economic social science knowledge as an indispensable component of the broader body of knowledge that had to be generated for the farmers' world, as the Centre's scientific products and recommendations. As a consequence, Cernea was deeply concerned about the relevance and effectiveness of CGIAR research in real life, particularly because often CGIAR's social research, with some exceptions, received little support from cost Centers' managers, and was often marginalized and chronically underfunded. This was happening despite the fact that the social research that had been carried out in prior years in CGIAR had proven many times its value and indispensability, beyond any doubt. A good number of truly excellent social scientists had joined in earlier years the CGIAR ranks through the "post doc" program financed by the Rockefeller Foundation, and many of them proved their mettle brilliantly by producing insightful research and findings highly relevant to CGIAR objectives. The names of stalwart social anthropologists and sociologists such as Robert Rhoades, Jacqueline Ashby, Ruth Meinzen-Dick, Joachim Voss, Carol Colfer, Pablo Eyzaguirre, Douglas Merrey and some others had written important pages in the annals of CGIAR research. One of them, Joachim Voss, acceded even to the position of Director for the major CIAT Center, but altogether, despite successes and demonstrated usefulness and usability, social research had been constantly under pressure and gradually squeezed in terms of its institutional position and when the "post doc" program stopped, the CGIAR defaulted on its prior commitment to continue expanding and funding more social researchers from its own resources.

From the outset, Cernea developed close links with these and other social researchers, and relied on them and his advocacy and organizational initiatives taken as a member of the TAC or Science Council. This collaboration helped reinforce the cause of social research but the high days of the "post doc" program were over, and competition for resources inside the CGIAR was acerbic and the "climate" was not favoring social research expression by any measure. The struggle continued to be an uphill struggle. A key argument was that social research findings should not be seen as just an add-on, but rather as a quality-enhancing intrinsic part of any research and any resulting strategy. We also co-authored a paper on 'Guarding the Relevance and Quality of Science in the

CGIAR' (Kassam et al., 2004). In it, among others, Cernea argued that CGIAR must put in place a vastly more "biting" and effective *ex-ante* peer review process of all research proposals to ensure that from the very start of a research project, the social dimensions are incorporated in the research plan and that every new research project is justified by its social and economic relevance to farming communities.

Our typical work pattern in TAC's 2–3 annual sessions included the analysis of the comprehensive external evaluation reports on scientific research by one or another of the CGIAR Centers. It was quite frequent for Michael to challenge the Director or Board-Chair of the analyzed Center, for marginalizing social research and underestimating its value. Since certain weaknesses were almost chronic rather than temporary or contextual, sparks were flying quite often. It was difficult to imagine a better-crafted argument in favor of social research than Cernea was able to provide based deeply on his familiarity with agricultural development projects in different countries in which he had worked over the years on behalf of the World Bank. The dominant feature was the constructiveness of his discussion, which invariably offered substance for including in the meetings' decision recommendations and commitments to expand the scope of social research and the resources allocated to the Center's social scientists.

His analyses revealed not just passing weaknesses but structural ones in the way research was designed or on the tenure and management over natural resources – water, trees, soil – that were studied by CGIAR's physical scientists. Michael would often argue that high-yielding varieties cannot succeed if we do not create for them "high-yielding patterns of social organization" through which farmers would get adequate the means required for cultivating them.

The allocation of social researchers to the Center's key themes was also an object of frequent controversy. Often, Center Directors tended to assign the social scientists excessively to the tail-end of the research process, simply to measure impact, while Michael would argue that their contribution should be incorporated from the very start of the research process so as to factor in farmers' needs, constraints, and factors like access to credit and markets. Only *ex-ante* factoring in knowledge on such social values, argued Cernea, could the biological and physical research become germane to the potentials and capabilities of local farming systems and communities.

AN ILLUMINATING PUBLIC DISCUSSION

The brief description above, however, elaborates on the structural parameters of Michael Cernea's work in the CGIAR. However, the most interesting question is: what did he actually do and accomplish? What were Cernea's views about the status, vocation, the successes and the failures, and mostly the challenges of doing social research within a set of scientific institutions dominated by biological and

natural resource scientists as well as economists who claimed to do research on crops, animals, fish, trees, etc. and on ecosystem management etc. all in the name of poverty alleviation, food and nutrition security?

The answer is not simple. Summarizing in just a few pages the content of some 8–9 years of work that Michael Cernea invested in CGIAR and in the valedictorian volume he left behind is a hard test. To confront this challenge, I will not follow the chronological path but rather go straight to that interval's end, when Cernea wrote his summing-up valedictorian assessment of social research in CGIAR. And I take permission to not put forward here only my personal opinions on Cernea's contributions, but instead rely on a public discussion and assessment by other academics from outside CGIAR of Cernea's leading role and ideas-impact. I can do this because *Culture & Agriculture*, a specialized journal of the American Anthropological Association, published in its pages the lead chapter that Michael wrote for our jointly-edited volume on social research in CGIAR (Cernea and Kassam, 2006) and invited its readership to participate in a public debate of its content. The "Call to Open Discussion" was signed by the journal's Chief Editor, Prof. James McDonald. About a dozen scholars sent articles and *Culture & Agriculture* published them in three issues spanning three years (Fall 2005, vol. 27 no. 2; Spring 2006, vol. 28 no. 1; and Spring 2007, vol. 29, no. 1). A lot of scholars responded promptly: Murray Leaf, Stephen Brush, William Loker, Ben Wallace, Donald Cleveland, Jude Fernando, Kendall Thu, Lois Stanford, Mina Swaminathan. Their comments are particularly relevant also because their authors are prominent social scientists who are independent of CGIAR, as full professors and scholars in various U.S. universities, who observe CGIAR as part of the academic community.

Michael's study ignited the public discussion because it was not just another article, but rather an expression of his personal creed, a true "manifesto" on behalf of social science's entitlement to solid "citizenship" in the CGIAR. Without mincing words, he protested the fact that social research, despite its indispensability, was nonetheless "*a domain that still today has to keep fighting hard for asserting itself against institutional barriers, against scholarly biases from other researchers or some centers' managers and against virtually constant underfunding*". He documented the innovative contributions of social research to improving farmers' livelihoods, while also blasting the "*major obstacles and institutionalized weaknesses in how social research is being carried out*".

Cernea also postulated another important idea that criticized the dominant practice in most CGIAR Centers: namely, that social research should not be exclusively a "component" immersed in the vaunted inter-disciplinary research in the CGIAR but must be empowered to also do full-scale stand-alone studies on certain independent social variables of agricultural production and development. He had no hesitation to denounce the "*shrinkage of human and financial resources allocated to social research in various centers*" on the grounds that "*behavioral and social cultural variables of resource management are no less important for*

sustainability than physical parameters". "The actual human capacity for social research in the CGIAR system at large and in some centers in particular" he wrote, "is either long-stagnant or has been severely depleted". He hailed the function of social researchers as "human knowledge conveyer-belts" between the CGIAR and outside scientific research and practice. He also constantly argued for bringing into the CGIAR some of the "important developments taking place in outside research in sociology, anthropology and social geography". To Michael, CGIAR's goal of germplasm enhancement, production intensification and natural resources management would not be complete without intensified socio-cultural research that would keep CGIAR's research programs and strategies relevant to pro-poor development and impact-oriented.

Throughout his tenure in the TAC and in the Science Council, Michael Cernea was consistent in taking an exacting analytical position to evaluating the contribution provided by social research to the objectives of each international research center, while at the same time incisively examining the usually scarce support provided by the respective center to social researchers and to integrating the social findings with the finding of biological and natural scientists.

Even Cernea's valedictorian study submitted for public discussion was, as usual, provocatively titled, criticizing closed "entrance gates" and claiming the right to recognized status for sociological research: "*Rites of Entrances and Rights of Citizenship: The Uphill Battle for Social Research in CGIAR*" (*Culture & Agriculture*, 73–87). He criticized strenuously the obstacles raised against allowing a broader "entrance" of social research in CGIAR, arguing that the very nature of the agricultural process, performed by the single widest profession in human history – the profession of farmer – gives social sciences a preeminent and legitimate "right of citizenship" inside CGIAR Centers.

The discussants liked Cernea's key ideas and conclusions, and embraced the entire book, which in the words of Mina Swaminathan from India:

"Gives rich and comprehensive image of the heroic contributions of social scientists in the CGIAR over three decades, accomplished against many odds and obstacles. But the book and [Cernea's] article also paint a dismal picture of the structured institutional constraints and deep-seeded intellectual biases against social research in many centers belonging to the international agricultural research system" (Mina Swaminathan, 1).

It was no surprise that others joined, in their own words. The breath of fresh air coming out from Cernea's sharp and candid study was received very well by the scholars outside of the CGIAR, no less than by those inside of it, expressing extraordinary support from CGIAR scholars to his critique and recommendations:

"...Cernea has done the readers of Culture & Agriculture a great service by publishing this piece in our journal" – wrote William Locker, Professor of Anthropology and Dean at the California State University – "*And the editors*

deserve congratulations for inviting debate and discussion on the important topics raised [...] in Cernea's article. Most of us...retain a belief in the power of methodologically sound empirical research as a public good: when deployed intelligently, it has the potential to ameliorate social problems. [This]...bears out the need to focus our intellectual energies on understanding and resolving the social and environmental crises affecting broad swaths of the globe" (William Loker, 17–19).

To this another discussant, Kendall Thu from Northern Illinois University, added:

"...The challenges posed by Michael Cernea's thought-provoking article on social research in CGIAR reflect a broader ongoing challenge in anthropology to make our efforts resonate more widely with a greater impact on policy...My primary theme takes a cue from Michael Cernea's ontological point that culture has a reality in the everyday lives of agricultural practitioners. My view is that we would do well to turn this around and not just reintegrate culture into agriculture but also integrate agriculture and food systems into broader cultural research, theory, and practice" (Kendall Thu, 25–27).

Almost all discussants likened Cernea's role in the CGIAR in pioneering social research to the same role he effectively previously at the World Bank. The main power in CGIAR Centers' Boards and management teams was with scholars and managers who did not put a big premium on social research. The context was one of an "uphill battle". The participants emphasized the intellectual continuity between what Michael as social scientist militated for and achieved previously at the World Bank and what he undertook to do to change CGIAR patterns as well. Murray J. Leaf, professor of anthropology and political economy at the University of Texas, noted that:

"Cernea has been central to the effort of urging the Bank to incorporate more noneconomic social science expertise in the design of projects. He also had a central role in organizing external scholars around themes that the Bank leadership could find intelligible. These primarily revolved around the problem of letting the Bank staff see the projects from the prospective of the intended [...] beneficiaries".

"Cernea's article raises concern about the use of social scientists across the entire development spectrum and entails fundamental issues of social theory. Note that Cernea is not calling for just any kind of social theory, but theory that will provide: better understanding of the decision-making process of individuals and groups; identifying the characteristics and needs of the ultimate beneficiaries, poor farmers and poor urban food consumers; the institutional arrangements needed to foster social capital creation; and improved property rights and custodianship regimes and their management and distributional implications. It also should be theory that 'puts people first' and facilitates the design of development projects which do so ... [We know] what CGIAR could do. What could anthropology do?" (Murray Leaf, 11, 14).

Cornea's robust argument obviously prompted CGIAR's outsiders to do their own self-questioning about the future of their own research.

Murray Leaf's "What could anthropologists do?" was further echoed by Kendall Thu:

"Cornea's insights from his experiences in CGIAR raise fundamental questions about the future of agricultural research in anthropology. The challenge Cornea poses transcends agriculture and resonates within our field as a whole. As such, the issue should not be what we can do to increase the viability of social research in agriculture. Rather, I believe our research, methods, and findings will lead the way, but what are the overarching questions and issues we are tackling?"

"I agree wholeheartedly with poverty reduction as a research goal of CGIAR and anthropologists in general. However, the fact that we face obstacles in becoming systemically effective in policy matters raises the question: why is this and what do we do about it?" (Kendall Thu, 25–27)

Ben Wallace, a professor at Southern Methodist University, added to this strand of the debate a mobilizing comment addressed to the world's anthropological community at large about the overriding responsibility of social scientists to their ultimate "clients" – the people. In a remarkably strong statement, he said:

"...In conclusion, the call here is for those of us who work in the field of rural development to remind ourselves occasionally, and others, that while we may work as an anthropologist, a plant pathologist, or an entomologist, and although we are paid by a particular institution, we are fundamentally responsible to the people of the world. If we fail them, we have failed not only ourselves but also those who are most dependent on us for help. Those of us who have chosen to work in the applied environmental sciences have a client—the people of the world. The only way to ensure that our clients are served is to ensure that people remain the central focus of our research and development endeavors" (Ben Wallace, 31).

To which Murray Leaf memorably concluded his powerful article with:

"To change the place of anthropology in development and in development policy, we have to change anthropology [itself]" (Murray Leaf, 16).

Other participants extended the debate to another very relevant area: the insufficient attention to social research in the National Agricultural Research Systems (NARS). Despite the abundance of rural sociologists in developing countries, the NARS did not use their skills within the national research centers. The strongest critique of this situation was formulated by Mina Swaminathan, an advisor of India's major Swaminathan Research Foundation, who wrote that that situation would be "*laughable if it were not so tragic*":

"...Ignoring the content and methods of social science research has been damaging enough for national research systems, damage many times multiplied in the case of international systems. Just imagine dozens of highly trained and well-equipped

scientists, arriving with all sincerity, zeal, and commitment in various parts of the developing world, and attempting to solve their agricultural problems with out any understanding of those societies, their structures, and systems! It would be laughable if it weren't so tragic” (Mina Swaminathan, 3).

The above excerpts are only a partial image of the intellectual richness of C&A's public discussion. The debate proved that Cernea's analyses resonated deeply with the profession at large. It also provided a robust platform to the CGIAR management for follow up.

Whether this platform, laid out in our 2006 volume by the entire CGIAR social science community has been properly used further by CGIAR management is a matter upon which other researchers should examine analytically and factually. I only want to briefly state that after Michael Cernea completed his tenure in CGIAR's leading scientific advisory body, the new CGIAR management, at the time, unfortunately, did not look for another social scientist of Cernea's stature to replace him. That was definitely an unnecessary loss and a CGIAR management error. One clear proof of that loss is reflected by the “stripe review” carried out in the CGIAR in 2008/09 on social science research in the system, a review whose analysis appeared to many readers as weak, insufficient, and circumventing major issues still unresolved.

The book ‘Researching the Culture in Agri-Culture’ did not embrace the official rhetoric pretending that all is well with social sciences and social research in the CGIAR. In fact, the book exposed the reality that ‘the emperor had no clothes’. The CGIAR system would do well to recognize the flaws and gaps in its current incorporation in social science research and take the necessary measures to overcome them. Moreover, many of the substantive issues raised by the above mentioned scholars (who are specialists in their topics) and most powerfully by Cernea, are still valid and unaddressed today. Sadly, the recent “stripe study” of social science in the CGIAR conducted in 2009, managed to avoid responding to the central weakness in the CGIAR which is the near total lack of non-economics social science capacity (CGIAR-SC, 2009). In fact, the stripe review deliberately avoided to even acknowledge the very existence of the book ‘Researching the Culture in Agri-Culture’ and to honestly address the in depth analyses and severe criticism contained in it, which provided the original core argument for mounting a stripe review in the first place.

The stripe review found that one-quarter of all internationally recruited research staff working in the CGIAR is engaged in social science activities (310 out of 1163 in 2008). The majority of these, 60%, are trained as economists (agricultural or other), followed by geographers (7%) and anthropologists (6%). Lack of critical mass among disciplines other than economics is a serious issue. Surprisingly, 8% of staff working on social science issues did not have an advanced degree in any social science discipline. However, the report failed to address the issue of the over dominance of economists and the gross under

representation by anthropologists and sociologists. In fact, despite the above key finding regarding the gross disciplinary imbalance within the social science group in the CGIAR, the stripe review report throughout appears to have analysed social science research in the CGIAR as an undifferentiated homogeneous mass of activities.

The stripe review has failed its mandate to distinctly examine the way CGIAR Centers fulfill their duty to bring in ALL the science knowledge essential to their mission. The deeply biased “*technocentric, econocentric and commodocentric models*” (Cernea 1996) that Michael Cernea denounced in other contexts, obviously transpire in the stripe review itself, as well as in CGIAR’s management of social research at large. Moreover, the stripe review appears to have been a waste of resources as it has led to no serious follow-up action. The CGIAR failed to address the core weakness of the stripe review in not highlighting grossly inadequate social research capacity in the CGIAR, a failure also discussed in a post-review workshopⁱⁱⁱ.

This counterproductive situation regarding social research in the CGIAR is related also to the current composition of its Independent Science and Partnership Council which lacks any voice for non-economics social sciences, except economics. This state of affairs is equivalent to an international medical research system conducting research in the name of human health care but without addressing issues related to human psychology, human behavior or social organizations.

Comparable dysfunctions exist also with regards to production systems research which the CGIAR handed over to unfunded National Agriculture Research Systems (NARS) in the early nineties with the argument that such research was site specific and that CGIAR research was to generate public goods of wide adaptability. Trapped by the apparent temporary success of its genocentric and agrochemical-based Green Revolution of tillage-based agriculture, CGIAR has in recent years failed to generate significant innovations that would improve production systems or lead to sustainable production intensification for small farmers. In the meantime, outside the CGIAR, farmer-driven production systems innovations in the form of no-till systems (now generally referred to as Conservation Agriculture) began to make their mark. The CGIAR System took no interest in CA until relatively recently when CIMMYT and ICARDA began to promote research on CA, followed by ICRISAT and ICRAF.

Similarly for flooded rice under irrigated and rain fed condition, the “System of Rice Intensification” (SRI)^{iv} made its mark due to a Jesuit priest, Henri Laulanié, working in Madagascar over a period of two decades (Laulanié, 1993). SRI has now shown its benefits in some 50 countries despite IRRI’s continuing to ignore the SRI phenomenon (Uphoff et al., 2011; Kassam et al., 2011).

A key message of the book ‘Researching the Culture in Agri-Culture’ is the need to accept that the farmers are capable of innovating, and that they and their socio-cultural environment must come “first” in any initiative claiming to assist them. Indeed, farmers in different parts of the world are already engaged in efforts

to generate, shape and advance the ‘new culture’ in *agri-culture*. Conservation Agriculture and the System of Rice Intensification are quintessential examples of this phenomenon to show that farmers can innovate alternative production practices in profound and deeply enduring ways, as illustrated by the CA pioneer farmers in Brazil, Argentina, Paraguay and elsewhere since the 1970s (Derpsch, 2004).

2. “CONSERVATION AGRICULTURE”: A RAPIDLY EXPANDING NEW GLOBAL TREND

In ancient times, *agri-culture* was recognized as being made up of the two parts, the ‘agri’ that related to the field environment (the natural resource base) and the ‘culture’ that related to the way it was managed for production and taken care of (Pretty, 2002). By this we mean the social and cultural values that informed social institutions to organize and support action by producers and the community. Values that informed behavior and social institutions were conditioned by the knowledge that existed then as derived and formulated through experiential processes and from observations, experimentation, logic and philosophical inquiry. The culture part embodied the knowledge, values and social norms that enabled production to be practiced along the lines considered to be the most acceptable or appropriate politically, socially, economically and environmentally for the individual land owners, producers and the community.

The knowledge system and the commercial and political elites of various blends including the religious ones that existed then determined, as they do today, the productive capacity of agricultural land and what could be produced and how much. Sustainability was a desired objectives but rarely achieved simply because what constituted ecological sustainability in production systems was not fully understood and therefore not integrated into production systems. *Agri-culture* as it was then practiced was under constant threat from land degradation and loss of productive capacity.

FROM MECHANICAL TILLAGE TO NO TILLAGE

The root cause of this has been mechanical tillage, with hand hoe and spade or animal-drawn ards and chisel ploughs or disc harrows/ploughs or mouldboard ploughs, that destroys soil structure/porosity, pulverizes the top soil and reduces soil organic matter and causes compaction and hard plough pan, top soil erosion and disrupts soil biodiversity, food webs/chains and ecosystem functions and services. Where in communities that did not practice tillage and protected the soil and its biological health with mulch cover and manure, and had a diversified production system with crop rotations involving legumes and intercropping,

sustainability of production was achieved for example in Peru's Colca Valley where the farmers still use the ancient terraces cultivated for fifteen centuries. According to Montgomery (2007), "These long-cultivated soils have horizons that are typically one to four feet thicker than those of neighbouring uncultivated soils. The cultivated Peruvian soils are full of earthworms and have higher concentrations of carbon, nitrogen, and phosphorus than native soils. [...] Under traditional soil management these Peruvian soils have fed people for more than fifteen hundred years".

In contrast, the notion of ecological sustainability and resilience has not been adequately pursued as an imperative and integrated into production systems management at the practical level. Today, over 90% of cropped agricultural land uses tillage as the basis of soil preparation for crop establishment, and tillage has become increasingly intensive since the introduction of the mouldboard plough in the thirties that led to the creation of dust bowls in the mid-west of USA, in Australia and in Russia and Central Asia. The machinery companies along with the agro-chemical and seed companies have promoted their products on an assumed premise that modern farming equated solely with intensive tillage, use of high levels of agrochemicals to 'feed and protect' the crops, and the use of mineral fertilizer responsive modern varieties grown within a fixed agronomy and crop management that insisted on high seed rates and plant densities.

Those persons who have been educated in the global North have been taught that this form of agriculture is what world agriculture must adopt everywhere to ensure food security, and in general the agriculture development community, particularly industrialized country donors and the scientific institutions they support, has been promoting it in the global South as the only way forward. The paradigm philosophy built around this assertive consensus is based on the socio-economic assumptions that the commercial private sector will be the provider of the inputs that will raise and maintain agricultural productivity and that any agriculture development initiative must accept this as the model for raising productivity and incomes, and enhancing the corporate and business sector to provide the supply chain and market services for agricultural products.

There have been some exceptions to this paradigm of tillage-based agricultural development, such as Arnold Faulkner who wrote the book *The Ploughman's Folly* in 1943, Fukuoka who wrote the book *One Straw Revolution*, and the pioneer farmers in the USA in the thirties and forties and in Brazil and elsewhere in Latin America in the seventies who switched to no-till farming as a means to control erosion and land degradation. Faulkner questioned the wisdom of ploughing and explained the destructive nature of soil tillage. He stated: "No-one has ever advanced a scientific reason for plowing". Further research in the UK, USA and elsewhere during the late-1940s and 1950s made no-tillage farming possible, and the practice began to spread in the USA in the 1960s, and in Brazil, Argentina and Paraguay in the 1970s. In 1973, Shirley Phillips and Harry Young

published the book *No-tillage Farming*, the first of its kind in the world, and this was followed in 1984 by the book *No-Tillage Agriculture: Principles and Practices* by E.R. Phillips and S.H. Phillips.

The modern successor of no-till farming – now generally known as Conservation Agriculture (CA) – goes much further. It involves the simultaneous application of three practical principles based on locally-formulated practices which have to coincide in time and space and have to be applied permanently to develop synergies (Friedrich et al., 2009; Kassam et al., 2009):

1. *Continuous minimum mechanical soil disturbance*; this translates into the practice of low disturbance no-tillage and the respective low disturbance direct seeding. Soil disturbance in all operations must be avoided as much as possible, allowing in some conditions of disturbance up to 25% of the soil surface but not wider than 15 cm in bands.

2. *Permanent organic soil cover*; this refers to mulch from crop residues, other organic mulch materials or living crops, including cover crops. The level of soil cover should ideally be 100% of the soil surface, but never less than 30% and should always supply sufficient organic carbon to maintain and enhance soil organic matter levels.

3. *Diversification of crop species grown in sequences and/or associations*; this refers to rotations and sequences of annual crops, mixed-, inter- or relay cropping, cover crops in perennial orchard or plantation crops, including legumes for their nitrogen effect as well as for their flowering in support of pollinator populations.

The individual CA principles have been practiced by farmers in different places for a long time (Derpsch, 2004; Montgomery, 2007). What is unique about the modern concept of CA is the conjunction of all three principles that are applied simultaneously through locally devised and tested practices. For production *intensification*, these core CA practices need to be strengthened by additional best management practices, particularly: (i) use of well adapted good quality seeds; (ii) enhanced and balanced crop nutrition, based on and in support of healthy soils; (iii) integrated management of pests, diseases and weeds; and (iv) efficient water management. Thus, CA, in conjunction with good crop, nutrient, weed and water management, is at the heart of FAO's new agricultural intensification strategy (FAO, 2011).

The expansion and mainstreaming of CA acutely needs now more organized support and institutionalization. My own current work for promoting CA in the world continues, in fact, in the same spirit and approach that Michael Cernea pursued in emphasizing the centrality of cultural and social variables in agriculture's development. This recognition of culture in agriculture, as I will argue further in this paper, has gained a 'magical' and crucial embodiment in the *agro-ecological* no-till paradigm that is increasingly replacing the old *interventionist* tillage paradigm. CA requires the social engagement of the rural producers in

translating the CA's principles into practice for harnessing an increased productivity and social and environmental benefits. To Cernea, the practices of "Conservation Agriculture" are "*central and germane to the culture of agriculture*" because they respond to the interests and deepest social and ecological propensities of the farmers. "*Farmers the world over depend on natural resources that make agriculture possible and because of this they are opposed – culturally and instinctively – to the exhaustive exploitation of the land, or the waste of water, or the destruction of forests*" (Cernea, personal communication, February 2012).

What Michael has taught so many of us is that in any human development activity including that related to agriculture the object and the subject must become one. The CGIAR with its heavy and often exclusive focus on genetic resource enhancement and reductive commodity science in the service of the interventionist tillage paradigm largely missed out so far on the CA phenomenon (and also on the System of Rice Intensification) (Kassam et al., 2009; Kassam et al., 2011) for two reasons. One reason is what Michael has been signaling for so long, as is stressed in the first part of these pages, – the lack or underestimation of real world socio-cultural context in CGIAR's technical agro-biological research, which too often misses the forest because some are not able to see beyond the immediate trees. The second reason is the acceptance of the interventionist tillage paradigm as being the norm and a base upon which to build sustainability through reductive science rather than with system science. CA and SRI are two examples of innovations that emerged more from the farming community than from the scientific community.

But there is a deeper and more worrying flaw in most of our so called modern research, education and development institutions, and that is the unquestioning faith in a virtually exclusive technocentric paradigm for agricultural development that puts market and business interests before public and environmental interest. And not only: worse still, most of those in the education, research and private sector who are involved in promoting the modern technocentric paradigm of agriculture do not have the basic understanding of the root cause of degradation of agricultural land resource base including the soil and landscape mediated ecosystem services.

The current mainstream production paradigm is based on an '*interventionist*' tillage approach that promotes the belief that agro-ecosystems can only be exploited through the use of intensive tillage, genetically enhanced modern cultivars and agrochemicals with standardized or fixed crop management. The alternative paradigm is based on an '*agro-ecological*' approach which promotes the possibility of harnessing desired output and productivity (efficiency) as well as other ecosystem services needed by society and producers.

CA is a convincing example of an agro-ecological production paradigm which is increasingly replacing the old '*interventionist*' tillage-based paradigm. CA comprises three practices – minimal mechanical soil disturbance, permanent organic soil cover and species diversification – applied simultaneously with other complementary good practices that allow sustainable production intensification.

The agro-ecological approach is diametrically opposite in concept and principles to the interventionist modern farming approach which is practiced with: (i) intensive high disturbance mechanical soil tillage, (ii) soil systems that are constantly forced to function in a biologically sub-optimal condition due to low organic matter, compaction and erosion, (iii) soil surface that is left bare and exposed to weather elements, (iv) normal soil-mediated ecosystem functions disrupted or destroyed, (v) mono-cropping or a cropping system that does not promote crop diversity or biodiversity in general, and (vi) standardized crop management based on excessive inputs of derived agro-chemicals.

In his well-researched book *Agri-Culture: Reconnecting People, Land and Nature*, Jules Pretty states that “the Roman agricultural writers such as Cato, Varro and Columella spoke of agriculture as two things: *agri* and *cultura* (the fields and the culture). It is only very recently that we have filleted out the culture and replaced it with commodity.” (Pretty, 2002). Pretty also states that “Our old thinking has failed the rest of nature, and is in danger of failing us again. Could we help to make a difference if we changed the way we think and act? The time has come for this next agricultural revolution”. (ibid.)

In another well-researched book, *Dirt: The Erosion of Civilizations*, David Montgomery tells us how humankind over the millennia has been degrading the soil resource base, at a rate faster than it can be replenished through tillage-based agriculture, and despite technological and scientific advances, ecological sustainability has generally eluded humankind over much of its agricultural landscape, in the North and in the South (Montgomery 2007).

Much of the world agriculture is continuing along the trajectory described by Montgomery but since WWII this ‘high disturbance’ interventionist agriculture has reached a point where tillage-based agriculture is not able to sustain crop and land productivity under high or low inputs. Also, currently, tillage agriculture as generally practiced internationally is inherently incapable of delivering key ecosystem services that are needed by society even with the most modern agricultural technologies and production inputs. Further, our intensive-tillage paradigm does not allow agricultural land to recuperate and self-repair under use, nor can it respond adequately to global challenges posed by poverty, climate change, increased food and energy prices and water scarcity. Worst still, the current mainstream production paradigm discriminates against the resource poor small farmers whose welfare is of core concern to the development-assistance community. Instead, it generates negative externalities whose economic, social and environmental costs are borne by the society. The interventionist tillage paradigm is far too expensive a model for the commercialization of agriculture and livelihood development of small resource poor farmers and their communities. This is because in this model, there is no room for integrating the ecological underpinnings of sustainability into the production system. Also, there is not much room for the farmers and their communities to experiment and innovate with radically new ideas such integrating CA or SRI principles into local production systems and practices.

Some experts have described the 1980's as the decade when the development-assistance community was reminded of the ineffective top down approaches to development and the imperial culture that had been dominating much of the mainstream development efforts. For example, the works of Robert Chambers (*Putting the Last First*) and Michael Cernea (*Putting People First*) served as loud wake up calls to development-assistance stakeholders regarding their 'us and them' linear strategies, often formulated without input from the potential beneficiaries and devoid of any analysis of the socio-cultural needs and impacts of their proposed interventions. This was like "putting the cart before the horse", or even worse "putting the horse on the cart".

THE NUMBERS ARE SPEAKING FOR THEMSELVES!

Empirical evidence shows that farmer-led transformation of agricultural production systems based on Conservation Agriculture (CA) is gathering momentum globally. The agro-ecological paradigm for sustainable production intensification embodied in CA is now being adopted by FAO, as described in its recent publication *'Save and Grow'* (FAO, 2011). CA, comprising minimum mechanical soil disturbance (no-till and direct seeding), organic soil cover, and crop species diversification, is now estimated to be practiced globally on about 125 M ha (some 9% of global arable cropland) across all continents (Table 1) and all agricultural ecologies, with some 50% of the area located in the developing regions. During the last decade, cropland under CA has been increasing yearly at a rate of some 7 million hectares, mainly in the Americas, Australia, and, more recently, in Asia and Africa (Friedrich et al., 2012).

Table 1

Area under CA by Continent

Continent	Area (hectare)	Percent of world total
South America	55,464,100	45
North America	39,981,000	32
Australia & New Zealand	17,162,000	14
Asia	4,723,000	4
Russia & Ukraine	5,100,000	3
Europe	1,351,900	1
Africa	1,012,840	1
World total	124,794,840	100

For the farmer the initial drivers for adoption of CA are mostly erosion or drought problems, as well as cost pressure. However, drivers of change that are valid for large scale farmers are different from small-scale farmers. Water erosion has been the main driver in Brazil, wind erosion and cost of production in the Canadian and American Prairies, and drought and cost issues in Australia and

Kazakhstan. More recently, concern about the economic and environmental unsustainability of traditional approaches to agriculture internationally, including small-scale farming in Africa and Asia, has stimulated governments to seriously consider CA whose principles can be implemented by small or large farmers in most agro-ecologies to raise productivity and harness environmental services, avoid and recuperate from land degradation, and respond to climate change.

The global empirical evidence shows that farmer-led transformation of agricultural production systems based on CA principles is already occurring and gathering momentum worldwide as a new alternative paradigm of agriculture for the 21st century. The data presented in Friedrich et al. (2012), mainly based on estimates made by farmer organizations, agro-industry, and well-informed individuals, provide an overview of CA adoption and spread by country, as well as the extent of CA adoption by continent. CA systems, comprising minimum mechanical soil disturbance, organic mulch cover, and crop species diversification, in conjunction with other good practices of crop and production management, are now practiced globally on about 125 M ha in all continents (Table 1) and all agricultural ecologies, including in the various temperate environments.

While in 1973/74 CA systems covered only 2.8 M ha worldwide, the area had grown in 1999 to 45 M ha, and by 2003 to 72 M ha (*Figure 1*). In the last 11 years CA systems have expanded at an average rate of more than 7 M ha per year showing the increased interest of farmers and national governments in this alternate production method. Adoption has been intense in North and South America as well as in Australia and New Zealand, and more recently in Asia and Africa where the awareness and adoption of CA is on the increase. Kassam et al. (2009, 2010) and Friedrich et al. (2012) present the history of adoption and analyses reasons and actual regional trends for adoption to draw conclusions about future promotion of CA.

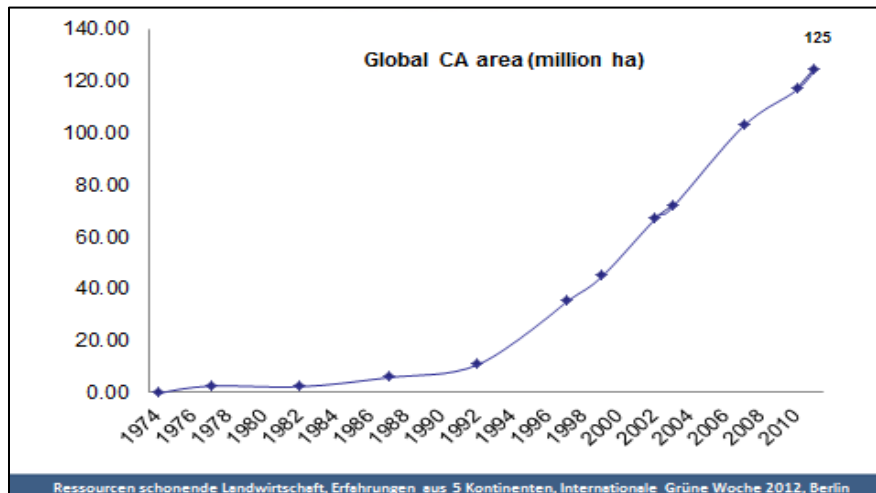


Figure 1 – The Global Spread of Conservation Agriculture.

CA calls for a fundamental change in production system thinking. It is counterintuitive, novel and knowledge and management intensive. The roots of the origins of CA lie more in the farming communities than in the scientific community, and its spread has been largely farmer-driven. Experience and empirical evidence across many countries has shown that the rapid adoption and spread of CA requires a change in commitment and behavior of all concerned stakeholders. For the farmers, a mechanism to experiment, learn and adapt is a prerequisite. For policy-makers and institutional leaders, transformation of tillage systems to CA systems requires that they fully understand the large and longer-term economic, social and environmental benefits which the CA paradigm offers to the producers and the society at large. Further, the transformation calls for a sustained policy and institutional support role that can provide incentives and required services to farmers to adopt CA practices and improve them over time.

Originally the adoption of CA was mainly driven by acute problems faced by farmers, especially wind and water erosion, as for example in southern Brazil or the Prairies in North America, or drought as in Australia. In all these cases farmers' organization was the main instrument to generate and spread knowledge that eventually led to mobilizing public, private and civil sector support. More recently, again pressed by erosion and drought problems, exacerbated by increase in cost of energy and production inputs, government support has played an important role in accelerating the adoption rate of CA, leading to the relatively fast adoption rates for example in Kazakhstan and China, but also in African countries such as Zambia and Zimbabwe, among others, and this is attracting support from other stakeholders.

Today the main reasons for adoption of CA can be summarized as follows:

1. better farm economy (reduction of costs in machinery and fuel and time-saving in the operations that permit the development of other agricultural and non-agricultural complementary activities); *2.* flexible technical possibilities for sowing, fertilizer application and weed control (allows for more timely operations); *3.* yield increases and greater yield stability (as long term effect); *4.* soil protection against water and wind erosion; *5.* greater nutrient-efficiency; and *6.* better water economy in dryland areas.

The world now needs to accelerate the spread of CA as a mainstream production approach, and the quickest and most effective way to do this is to 'put farmers first' so that they can devise locally adapted CA practices consistent with CA principles, and for the public and private sector institutions to support them to lead the way with their locally-devised multi-stakeholder solutions. This is already happening in countries such as Brazil, Argentina, Paraguay, Canada, USA, Australia, New Zealand, Kazakhstan, India, China, South Africa, Zambia and Zimbabwe. CA principles are like the universal principles of human rights and dignity that apply to all human beings everywhere but only meaningful if adopted humanely and upheld by human beings themselves in their local socio-cultural contexts.

In the early 1990's, the CGIAR decided to devolve its production systems research work to NARS, claiming that production systems constraints (and therefore solutions) were location specific whereas the CGIAR's research was aimed at generating international public goods of wide adaptability. So, instead of strengthening its production systems research to identify the underlying agro-ecological principles for sustainable intensification, the CGIAR expanded its natural resources management (NRM) mandate, and its NRM research agenda which proved difficult to define and implement (Harwood et al., 2005, 2006). This shift of emphasis further weakened CGIAR's focus on sustainable production intensification and the multi-functional role of agriculture at a time when productivity of the wheat-rice cropping system in the Indo-Gangetic Plains was beginning to decline, and severe agro-ecosystem degradation resulting from the Green Revolution approach to intensification was becoming visible. Consequently, the CGIAR System largely missed out on the international CA opportunity for pro-poor sustainable development (and also on SRI and other agro-ecological production system opportunities). Through this opportunity, which exists even today, the CGIAR and its partners could promote the widely adaptable CA principles of sustainability through locally devised production practices. Such a move would be not only relevant for poverty alleviation but can also contribute to national and international food security and respond to global challenges of land degradation and climate change. Fortunately, in recent years Centres such as CIMMYT, ICARDA, ICRISAT and ICRAF have been responding to the CA opportunity with good success. Strengthening the socio-cultural and ecological context of CA research can only make CGIAR more relevant in the future.

Today, we have more reasons than ever to drive the needed paradigm change in agriculture socially because it cannot be done otherwise. This applies to the developing world as well as to the industrialized world. Social research for sustainable production intensification and for environmental stewardship is a reality, and must be made to become a greater force for good for all mankind. Otherwise, we will continue to impose unnecessary hardship on the less fortunate people. Our global economic system allows 1.5 billion people to remain hungry, side by side with 1.5 billion people who remain unhealthily obese.

Today we have CA and SRI and others such as evergreen agriculture (which is CA with trees), all more capable of empowering the poor and the less fortunate, improving their livelihoods and food security. Unless the CGIAR embraces comprehensive research on CA, SRI and other ecologically-friendly production systems, it will not be working enough for pro-poor sustainable development, despite its rhetoric on poverty alleviation and food for all.

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Many of us have learned from Michael Cernea that in any human development activity, including those related to agricultural research, the object and the subject must merge and remain united to ensure 'positive-sum outcomes' as much as possible. This is one reason why the post-graduate course I teach at

Reading University, UK, is entitled “*Rethinking Agricultural Development: Implementing Solutions*”. There is indeed much to rethink, learn and teach about the future multi-functional role of agricultural land use which must respect and use the resources of the socio-cultural environment as much as the ecological and economic environment, and to reflect upon past short-comings and achievements. Systems such as CA and SRI show superior performance and spread more effectively when they are a part of a multi-stakeholder innovation system in which the farmers and their rural communities have a lead role. For the alternate agro-ecological paradigm to spread and replace the old interventionist paradigm will require, as Cernea has urged, “people who have not only brains but who can fight, people who have not only knowledge but also have conviction, and people whose anthropological knowledge is accompanied by a moral dimension”.

This is Cernea’s challenge to us all – to carry on our work with readiness to engage scientifically and proactively, in the spirit of “militant social scientists”.

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ⁱ The Consultative Group on International Agricultural Research (CGIAR), established in 1971, is a global consortium or partnership that unites specialized high-powered research organizations created and financed by the international community to support, improve and expand the scientific research needed by the world's agriculture for sustainable development and eradicating hunger. The financing of CGIAR's network of scientific centers is provided by the Governments of developing and industrialized countries, foundations, the World Bank, the FAO (Food and Agriculture Organization), the UNDP (United Nations Development Program) and a series of other international and regional organizations. The Consortium consists of 15 International Agricultural

Research Centers, which work in collaboration with hundreds of partner organizations, including national and regional research institutes, civil society organizations, academia, and the private sector.

The organism that advises on and guides CGIAR's policies and scientific research work has been initially its TAC (Technical Advisory Committee), then renamed as its Science Council (SC) and recently as its Independent Science and Partnership Council (ISPC); it consists of 10–12 scholars of high international reputation specialized in sciences crucial for CGIAR's mission. The multidisciplinary research staff of each Center is also multinational. The Centres include: CIMMYT – Centro Internacional de Mejoramiento de Maiz y Trigo; CIP – Centro Internacional de la Papa; ICARDA – International Center for Agricultural Research in the Dry Areas; ICRISAT – International Crops Research Institute for the Semi-Arid Tropics; IFPRI – International Food Policy Research Institute; IITA – International Institute of Tropical Agriculture; ILRI – International Livestock Research Institute; IRRI – International Rice Research Institute; CIAT – Centro Internacional de Agricultura Tropical. The annual budget of the CGIAR is some US\$ 600 millions.

The new wheat varieties from CIMMYT and rice varieties from IRRI, created after years of extraordinarily painstaking genetic and multidisciplinary research, have been central to the triggering and success of the Green Revolution, making possible gigantic increases in agricultural production and productivity.

The Vision of the CGIAR is: to reduce poverty and hunger, improve human health and nutrition, and enhance ecosystem resilience through high-quality international agricultural research, partnership and leadership. The objectives are: (i) Food for People: Create and accelerate sustainable increases in the productivity and production of healthy food by and for the poor; (ii) Environment for People: Conserve, enhance and sustainably use natural resources and biodiversity to improve the livelihoods of the poor in response to climate change and other factors; and (iii) Policies for People: Promote policy and institutional change that will stimulate agricultural growth and equity to benefit the poor.

ⁱⁱ In the terminology of athletics, the wording “contact sports” is used to describe certain games or sports in which the terms of engagement allow, and often demand, physical body contact between players which is often rather dangerous. By extension, the term “contact sport” is employed also for intellectual engagements in which the engagement and clashes between opposing viewpoints may become very contentious and steadfastness is required.

ⁱⁱⁱ This failure has been criticized also by the workshop organized in Montpellier (March 2009) by the Alliance of the CGIAR Centres, Bill and Melinda Gates Foundation and the interim Independent Science and Partnerships Council (CGIAR, 2010). The workshop was convened to follow up on the stripe study in order to stimulate a higher level debate on ways to improve the state of social sciences in the CGIAR. The workshop highlighted that the restrictions in funding on social sciences has been serious, and that “the effect on social sciences has been more serious” than on biophysical sciences. It also emphasized that “NARS capacity in social sciences deserves greater attention” and that “linkages between social sciences and others should be enhanced”.

^{iv} The System of Rice Intensification (SRI) represents a paradigm shift in rice cultivation, making a change from the traditional practice of growing the crop in flooded soils to growing it in an aerated soil with different crop and water management. The validity of the SRI methods has now spread to some 50 countries in Asia, Africa and Central America. SRI agronomic and water management practices differ fundamentally from those used in traditional rice systems in which fields are kept flooded either naturally or with irrigation. See for a detailed description.