'A World Free From Hunger': Global Imagination and Governance in the Age of Scientific Management

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Literature examining the global agro-food system after the post-WWII period has been criticized for ignoring the plurality of governance mechanisms that may complicate a production regime approach (Goodman and Dupuis 2002; Marsden 2000; 1999; 1997; 1992). Yet, the consumption-oriented and network approaches that have so far been developed as critical alternatives to the production regime approach have underplayed the global possibilities of their perspectives, highlighting instead local and national processes. Accounts that identify the nation-state as the primary regulating mechanism of the agro-food system during the post-war years do so at the risk of underestimating the significance of the global governance mechanisms at play during this period and their role in delimiting rural spaces for nation-state governance. Moreover these accounts contribute to the associated problem of truncating the historical trajectory of globalization processes. In this paper, we take a step toward filling this gap through an historical examination of an international organization that had considerable governing authority in the food and agricultural affairs of nation-states in the post-war years - the Food and Agriculture Organization of the United Nations (FAO).

The FAO is an ideal site for an examination of global governance issues for a number of reasons. First, its mission has always insisted on the interconnectivity of food and agriculture, that is, of consumption and production processes. Unlike the rural sociology literature which often set up an artificial divide between the two processes (only to come full circle with attempts to bridge them together, Goodman and Dupuis 2002), the FAO has viewed consumption problems such as nutrition and hunger as inseparable from production problems such as yields and land tenure. Its mandate was, as it continues to be, to ensure that the world is appropriately provisioned, and as such, its interventions on global scales inform us about a particular vision for accomplishing this task that may provide useful clues for a critical examination of current food regimes that are of concern to a range of analysts (Moran et. al. 1996; Lockie et. al. 2000; Le Heron 2003). Second, though we argue here that the FAO has had a particular propensity for undertaking colonizing activities on a global scale, it

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is a public organisation. Global governance has usually been associated with private institutional and corporate power in the hands of transnational companies (TNCs) and more secretive organizations such as the World Trade Organization. While the FAO may not have always welcomed public participation in practice, its authority and ability to intervene is derived from and ultimately limited by the desires of its membership - the member states that form the basis of the organization.[1] This distinction of the possibility of civic participation is important if we are to re-think the production and distribution of food beyond TNCs and beyond nation-states. Organizations such as the FAO provide at least a theoretical alternative to other global organizations/corporations that lack public accountability and transparency and that currently dominate food and agricultural processes. Third, the FAO possessed considerable legitimacy to govern across borders; indeed, in the early post-war years it wielded sufficient power to re-invent the world of food and agriculture and record them in new ways for global viewing. This ability was due in large part to the particular historical circumstances in which the organization emerged: new political alliances and a faith in the United Nations system had developed at the same time as a crisis in food scarcity after the war. These circumstances, combined with the global mandate of the FAO, provided a unique opportunity to build consensus on re-imaging food and agriculture beyond the needs of particular nation-states.

The role of the imagination is integral to our particular understanding of governance. Our starting point here is the critical perspectives on governmentality provided by Michel Foucault (1991), Nicholas Rose (1999), Tania Li (1999; 2002), and others. For our purposes, studies of governmentality are:

> studies of a particular 'stratum' of knowing and acting. Of the emergence of particular 'regimes of truth' concerning the conduct of conduct, ways of speaking truth, persons authorized to speak truths, ways of enacting truths and the costs of so doing. Of the emergence and assemblage of particular apparatuses and devices for exercising power and intervening upon particular problems. They are concerned, that is to say, with the conditions of possibility and intelligibility for certain ways of seeking to act upon the conduct of others, or oneself, to achieve certain ends (Rose 1999, p. 19).

In its efforts to assess what the globe required to be 'free from hunger' in the post-War years, the FAO employed specific techniques that served to envision a new world of conduct for food and agriculture. A governmentality perspective encourages us to explore what devices were employed, how truth claims were established, and what possibilities were made imaginable to permit the development of, what we call, global food governance. Global food governance refers to an expanded notion of relations of rule 'at a distance' which involve specific efforts to animate and govern the conduct affecting food and agriculture on global scales. In this paper we specifically consider how science and scientific management were tied to the emergence of global food governance during the post-WWII era.[2] We outline how the FAO's reliance on the scientific imagination and its construction of knowledge necessarily redrew boundaries to constitute a diverse array of social relations and practices that contributed to global food governance during this period. This process of change resulted in viewing: people as populations in need of training; places as land and agrarian structures that needed improving, and; food as commodities that required

monitoring. Such new imaginations of people, places, and food were premised on the acceptance of a scientific approach that permitted the comparison of otherwise distinct contexts and subjected local knowledges to the supremacy of scientific images of, and universal claims for, food and agriculture. These global imaginations, based upon scientific judgements and assessments, contributed to understanding social and economic networks of food trade as self-regulating. However, we consider it essential to view such networks as sites of global food governance, or what Li might call "sites of governmental strategies" (2002, p. 1), that are subject to improvement, investigation, and scientific management.

Global Food Governance and Scientific Management

While current studies on the global transformations of social and economic relations over the last quarter of a century are plentiful, the profound global changes that took place in the quarter century before this time require further examination. The characterization of the current period as one of 'globalization' and the previous period as embedded primarily in nation-based concerns is partly to blame for our dim memories of this time period. Given the immense implications of globalization today, who cares about what happened 50 years ago? Yet many new international organizations emerged during the late 1940s and 1950s, giving rise to new forms of social networks, identities, and conduct that appear to be very much with us today. Of course 'time', particularly the past, becomes significant when we need it to be,[3] but we are not the first to note that the emphasis on global relations 'today' (post 1970s) and on nation-based interventions 'in the past' (pre 1970s) involves a considerable manipulation of time and space. The distinction creates the illusion that we are now living in a unique period involving 'new' spatial territories, and leaves the global relations of the past - if they are indeed acknowledged at all - in a black box.[4] In our view, abandoning efforts to examine the historical role of global organizations in transforming food and agriculture not only distorts the past, but presumes that the present and the future are not susceptible to the past. Our research indicates that the FAO was influential in both 'relegating certain productive and consumption spaces over others and providing agency to some while marginalizing others' (to paraphrase Marsden 2000, p. 28), a legacy that still forms part of what we 'know about and how we grow' (Goodman and Dupuis 2002) food today. New global relations were produced through the FAO: its activities involved restructuring and extending international networks of goods, people, and knowledge, and facilitating their passage within national and local spaces (see also Phillips and Ilcan 2002; 2003). It was through these global relations that new ideas about food and agriculture perforated remote regions around the world and signaled local knowledges and imaginations as objects of international trade and commerce, long before the benchmark years of the 1970s.

The role of the imagination was critical in re-defining the parameters, qualities, and categories of food, and in mobilizing the expansion of global food trade networks during this early period. As Appadurai reminds us, the role of the imagination in cultural and political life is an important dimension of social change. As he asserts,

> The imagination is no longer a matter of individual genius, escapism from ordinary life, or just a dimension of aesthetics. It is a faculty that informs the daily lives of ordinary

> people in myriad ways: It allows people to consider migration, resist state violence, see social redress, and design new forms of civic association and collaboration, often across national boundaries. This view of the role of the imagination as a popular, social, collective fact in the era of globalization recognizes its split character. On the one hand, it is in and through the imagination that modern citizens are disciplined and controlled - by states, markets, and other powerful interests. But it is also the faculty through which collective patterns of dissent and new designs for collective life emerge (Appadurai 2001, p. 6).

For Appadurai, the imagination is a social force that works across national lines and interfaces with many diverse 'objects in motion,' such as goods, people, and populations that move from place to place. While Appadurai is less inclined to examine the question of governmentality, his view of the imagination is a fruitful extension of the emphasis in the governmentality literature on truth-claims and how they are assembled as ways of 'knowing and acting' and as objects and goals of governance.

Closely linked to the development of conceptions of global food and agriculture is a kind of imagination that draws its strength from modern science: an imagination built upon concepts of universalism, comparability, reliability, and value-neutrality. Applying such concepts and languages, as well as employing scientific measurement and calculation techniques (see Barry 1993), to the milieus of food relocated notions of food into new fields of economic or political interrogation, such as those related to supply and demand. Such transformations came to reconfigure a variety of historical and cultural meanings that were once associated with food and diet (see Beardsworth and Keil 1997; Goody 1997; Tomlinson 1999).

A new scientific imagination that centered around global access to food necessitated that food be re-imagined in ways that appropriated and subjugated local knowledge, and which theoretically separated local knowledges of food from the dimensions of culture embodied in producing it. This process occurred, for example, through the global standardization of food that intensified in the post-war period (Ilcan and Phillips 2003b). Through a wide array of technical devices, theoretical languages, and standardizing practices, a new scientific imagination identified and reworked local knowledge into new assemblages that could, not coincidentally, facilitate the expansion of global food trade networks. These new assemblages - of place, bodies, and knowledge - were forged through attempts to translate local practices into universal 'authorized' designations (see Bourdieu 1977; Latour 1987; Scott 1998; Fischer 2000). The scientific mobilization of these assemblages offers a clue into the development of a plurality of governance mechanisms for managing the global ago-food system during this early period. It also provides an entry point into the conceptual framework that guides our understanding of the FAO's historical role in global food governance.

Scientific knowledge in the twentieth century was characterized, as it is today, by its disciplinary professionalization and by the professionals' ability to produce ideas and categories that would transform social life. Modern science professionals in disciplines ranging from biology and economics to statistics and geology were themselves disciplined in particular bodies of knowledge that permitted them to claim high-level intellectual skills (see Isin 2002, p. 248). By the 1940s modern, disciplinary-based science had come to dominate understandings of what

constituted 'rational' designs for social and economic life - and an ever-expanding set of spatial territories, from the household, to the factory, national economies, and beyond, that could and would be subjected to its gaze.

Leaving aside the claims of neutrality and objectivity (and despite its continuing dominance as such in global knowledge production today), many researchers have noted the extent to which science is culturally informed (Latour and Woolgar 1979; Nandy 1992; Busch 1994; Traweek 1998; Reid and Traweek 2000). Science is cultural in at least two senses: science is susceptible to the cultural values in which it operates, such as the values based on the need to contain unpredictability and regulate unwanted transformation; and science is a culture with specific languages and methodological underpinnings (observation and control) for the production of knowledge. Both senses are important to our case here, as will be illustrated in the following sections. First, scientific approaches to managing food and agricultural issues were not only dependent upon particular measurement and calculation techniques (see Phillips and Ilcan 2002; Ilcan and Phillips 2003), but were shaped by concurrent discourses for how societies and economies should be organized. Second, scientific methodologies and languages were widely employed to identify, examine, and provide remedies for global food problems.

The active role taken by modern science in re-imagining the things that could be produced and consumed (such as food) and the persons who produce and govern the producing (farmers, managers) was very much shaped by the ideologies and policies of the post-WWII period. Fordism and Keynesianism [or what Webster (1995, p. 138) calls Fordist-Keynesianism] and Taylorism were, in our view, critical themes connected to modern scientific approaches during this period. As has been noted by others, the welfare-state and employment policies of Keynes helped to guide capitalism beyond the crisis of the thirties with a particular emphasis on social and economic stability, class consensus, and consumption (not just production) conditions (Shields 1990; Russell 1999). These ideas lent legitimacy - through an appeal to "economic science" (Murphy 1989, p. 227) - to the policy of market intervention in order to maintain the overall stability of society and permitted a focus on the demand side of capitalism. Fordist ideas of mass production and mass consumption complemented Keynesian policies of full employment and social stability. The Fordist vision of assembly-line production was based primarily on a combination of new technology, efficient bureaucracy, and mass expansion of the consumer market,[5] a vision that captured the imagination of employers and planners throughout much of the world "as a symbol of efficiency, technological progress, and the power of science" (Tsutsui 1998, p. 65).[6]

Enlisting modern science to re-imagine food during this period was also linked to the concept of 'scientific management' invented by F. W. Taylor and applied in the early decades of the twentieth century. Taylorism not only re-designed work sites to ensure the elimination of time and motion 'waste', but postulated the separation of planning from execution in the production process (Braverman 1974; cf. Burawoy 1985), shifting the former into the hands of managers. In the 'managerial revolution' (Burnham 1941) managers could be envisioned as neutral decision-makers, with organizations and other work sites becoming laboratories to be supervised rationally and holistically. More specifically, scientific management involved assembling and producing a wide range of functional and intellectual instruments to generate what

Taylor termed the "mechanism" of scientific management. The mechanism of scientific management involved: standard tools, adjustable scaffolds, implements of time study, books and records, a differentiation of work into standard tasks, written instructions, the scientific selection of the working person, and many other aspects. Taylorism entailed the calculated construction of a set of durable connections among persons, forces, and things, under a certain form of scientific knowledge, and in relation to very specific objectives. Such 'scientific management' attempted to render productive bodies calculable and manageable in the name of industrial efficiency and to enable managerial authority as rational and objective (Rose 1999, p 53, p. 125).

To say that the ideas of Keynes, Ford, and Taylor influenced the scientific imagination of food during the post-war years is not to say that science was 'Fordist-Keynesian' or 'Taylorist' but to point to the ways in which the techniques and rationalities of global food governance were shaped and guided by diverse fields of knowledge. It was the drawing together of particular threads of these fields that made it possible to imagine, garner support for, and develop a 'responsible' management of world-wide territory through the large-scale planning of production and consumption networks. It was within such planning on a global scale that food and agriculture could become mobile products, 'objects in motion,' in a kind of assembly line designed to have the global food system - supply and demand - operate more efficiently. Through a neutrally-orchestrated 'science of (global) society,' farmers could increase their production, consumers could be well provisioned, and both groups could consent to the bureaucratic integration of a post-war world (in contrast to a disintegrating war-torn one). From a governmentality focus, we view the emphasis given here to global growth and development as part of a more general concern to bring about "improvement" (see Li 2002, p. 2) in food production and consumption backed by scientific investigation.

The culture of science was also an important device for the emergence of the global system that sought to shape the contours of food production and consumption in the post-war period. When science accommodates a spatial shift to global responsibilities, it is not difficult for its practitioners to imagine the world as a kind of laboratory in which symptoms can be identified, examined, and diagnosed through scientific investigation. In this case, the invention of a world 'free from hunger' required scientific investigation into why food productivity and consumption levels were low and how to change them. The controlled, detached environment that makes scientific investigation possible served the investigation well since it signalled that the diversities of nature and culture within the global laboratory would have to remain on hold, at least while the investigation was ongoing. Visvanthen (1988a) calls this the 'vivisectional mandate' of science, and shows how in the field of international development, the body/politic of the 'other' is disassembled, scrutinized, and inflicted with pain in ways that ensure the ultimate control of scientific managers.

Why were scientific observation and its products so strongly embraced in a project involving global food? In part, the aftermath of WWII provides an answer. Food shortages, the widespread destruction of infrastructure, and emerging political tensions offered a useful contrast for promoting ideas of cooperation and global harmony through the application of what appeared to be apolitical principles. Science was considered value-free, "aloof from politics" (Visvanthen 1988b, p.

117);[7] it apparently could be enlisted for re-imagining food and agriculture with minimum protest. Also, by the late 1940s scientists were becoming well known for their innovations in the fields of food and agriculture including, for example, the development of plant breeding, animal nutrition, genetic food engineering, agricultural and development planning, food and crop classification systems, plant and animal disease control, and human diet and nutrition standards. There existed high respect for and enthusiastic optimism about the potential of such innovations to solve food and hunger problems.[8] The incorporation of these scientific innovations into a developing world agriculture was seen to be critically important to its future 'stability.' In this way, modern science not only introduced new imaginations of the world but played a pivotal role in producing global knowledges of food. It did so through specific governing techniques and rationalities diffused by those international organizations mandated to 'fix' the world.

How did the FAO govern?

In the aftermath of WWII, the United Nations' Food and Agriculture Organization was charged with the responsibility of developing a stable world agriculture that would eliminate hunger and malnutrition.[9] Explicit in the FAO's vision for preventing future food crises was the need to integrate the world by developing global trade ties, world markets, and populations with 'purchasing power.'[10] Attaining global stability and integration required "rational" planning and widespread agreement to "immediate and positive action" for an ambitious project that merged national differences and required member nations to think about the needs of the globe (FAO 1949a).

From its inception, the FAO reminded member states of their social responsibilities beyond their particular national concerns:

> Commission A [of the FAO] wishes to remind all member governments of the individual and collective responsibilities they assumed in accepting the Constitution of FAO. If the nations are to promote the common welfare by raising the levels of nutrition and the standards of living of their people, by introducing improvements in the efficiency of their production and in the distribution of food and agricultural products, and by otherwise bettering the conditions of the rural populations, they must be prepared to take vigorous action on a broad front. It is the role of FAO to assist governments in attaining these ends (FAO 1946a).

The success of the FAO in developing consensus on global food governance depended on its effectiveness in convincing members of the essential connection between particular modes of calculation of, and intervention in, the world and global food security in the future. Establishing such a connection was viewed by the FAO as a "substantial ultimate benefit to all" (FAO 1949a, p. 6).

Even with the threat of the war-related food crisis subsiding by 1949, the need to 'attack joint problems with joint action' still remained, in large part due to the identification and elaboration of what came to be known as the 'poverty gap.' The concept of the poverty gap grew out of global images that dramatically compared farmers in underdeveloped regions as having 'nothing to work with' to farmers in the

more advanced countries who have "a tractor, truck, and other complex and efficient machines, barn and workshops, fertilizers, insecticides, seed of the best known varieties of plants, good breeds of livestock, news and market reports by radio, and a research station and extension service not many miles away" (UN 1949, p. 138, cited in FAO 1949a, p. 2). Under the gaze of scientific management, the poverty gap appeared as an immense, complex, and long-term problem (having the one 'catch up with the other...will take many years of step-by-step progress') and consequently "big plans must be drawn and set in motion" (FAO 1949a, p. 3). The scale of the vision is evidenced in many iterations that focus on a concern for the 'improvement' in world trade, including the following:

> The raising of the levels of living of rural populations calls for the improvement of agriculture, rural industrialization, large-scale public works, and social and educational services in the countryside, and the raising of the levels of living of many different races and peoples. This in turn requires a reorientation of world agriculture and of world trade in which food will be treated as an essential of life rather than primarily as merchandise (FAO 1946a).

Such improvement plans required an organization built on administrative and scientific principles with its associated techniques of observation, record-keeping, and calculation: "it is essential that FAO possess a solid administrative, scientific, and technical organization." (FAO 1946a).[11] In the fashion of post-war corporate bureaucracies, a Director-General headed the agency, with the support of an Executive Committee, followed by the Divisions of Nutrition, Agriculture, Economics, Statistics, Forestry, and Fisheries.[12] Standing Advisory Committees and Ad Hoc Committees would be formed to study particular questions for advice to the Divisions (FAO 1946a). The bureaucratic arrangements of the FAO also took into account the need for centralized planning, on the one hand, and global execution, on the other. Global execution meant moving beyond national borders to a focus on 'regions' (thus, a large proportion of FAO charts and tables, and all training centres and conferences, are regionally-based).[13] Control over the activities of regional centres was important to prevent divergence from the global plan. Thus the "centralization of policy and technical direction" took place at Headquarters and the:

> decentralization of execution [would take place] through the appointment of regional representatives assisted by permanent regional offices. In this way, all regional work will be closely integrated with headquarters organization and policies, and the danger of autonomous regional offices pursuing independent policies may be avoided (FAO 1948a).

Apparently the "world's great needs" demanded that "great decisions" (FAO 1949a, p. 6) be made at the centre where the knowledge and techniques of modern agriculture presided. Such control included the definition of what constituted an FAO 'Mission': "To deserve the name, a Mission should be composed of a substantial group of recognized experts, and should spend sufficient time on the project to arrive at definitive conclusions and recommendations" (FAO 1946a).

This system of scientific management was particularly important for administering one of the thorniest components of FAO's mandate: mobilising international trade. Despite arguments that international trade was really only

a problem of the 'advanced countries' (FAO 1949a, p. 4), the FAO explicitly took into account the 'less advanced regions' in its observation of international trade problems. It calculated a balance between food production and consumption to ensure global stability, and, more subtly, to mediate the differences emerging in the export orientations of the North and South.[14] However, in "piecing together the [global] story" (ibid, p. 18), the FAO looked beyond the trade problems of particular nation-states. For example, the FAO proposed ways of achieving price stability through the creation of a Global Food Board and promoted the efficiency of food trade by recommending the realignment of agriculture at national levels. Some "reorientation of production" was in order (e.g., if too many countries produced the same product) to "prevent serious log-jams" (ibid, pp. 4-5) in what could be conceived of as a kind of 'global assembling line' in the service of world trade. "In the interests of the world economy" the FAO recommended that resources be "transferred from one line of production to another" (ibid, p. 5). It was recognized that such a 'reorientation' may bring temporary "hardship" to individual nations, but technical assistance was available and "should be mobilized to help the country develop new lines of production" (ibid, p. 6). Countless tables and charts were also introduced into the laboratory of the world to measure the volume of trade, terms of trade, and trade agreements by region and by product, and - much like the invasion of medical instruments - to ensure proper realignment. The FAO's "strenuous efforts to get food moving and keep it moving across the frontiers" (ibid, p. 4) are reflected, for example, in the FAO's *State of Food and Agriculture: A Survey of World Conditions and Prospects* which painstakingly lists the multiple trade agreements negotiated between nations in 1949 alone, showing that "something like 80% of the world's trade in food and agricultural products [is] now being covered by such agreements" (ibid, p. 15).

In its effort to imagine a world free from hunger, the FAO invented a contradictory world full of hunger yet full of possibilities. Through the realm of scientific management a globally assembled knowledge of food and agriculture could be animated by truth-claims backed by estimates of validity and reliability. As illustrated in the following section, food and agriculture could thus be categorized, placed into standardized units, and objectively compared and evaluated within a universally accepted framework. Surveys, charts, tables, and censuses - as techniques of accounting, measuring, and monitoring - dissected the world's food, left it open to scientific calculation, and signalled new ways of problematizing and assembling food and agriculture. We consider specifically how food and agriculture were globally re-imagined through the prisms of diet, food composition, and agricultural censuses.

Scientific Assemblages of Food and Modern Agriculture

Scientific management and the computations of performance and efficiency have long been recognized as central activities within most modern bureaucratic and industrial organizations. Various measurements have been used to assess the condition of a given land or employed as social and economic indicators, such as those of poverty, productivity, outputs, and trade (Barry 1993, pp. 464-465). There are also measurements of the quantity and composition of particular national resources, the health of

populations, and the uses of various foods. As we have indicated above, scientific computations may not only create new ways to imagine particular commodities like food, but serve to legitimate the reassembling of consumption and production practices in ways deemed to be 'efficient.' What is equally important is the manner in which scientific management and calculation can be exercised to govern vast territories and populations, and tied to the practices involved in global food governance.[15]

In its efforts to calculate hunger and malnutrition the FAO introduced and applied measurement techniques for comparing food supplies, dietary knowledge, and consumption practices in all regions of the world. In 1948, for example, sixty-eight cities with a population of 2,500 or more were sampled in a large-scale FAO-assisted dietary survey designed to assess food consumption levels and "inadequate diets" among families living in the United States.[16] A family was considered to be the "easiest and most appropriate unit to deal with in making dietary surveys" since it was deemed to be "the food purchasing and consuming unit" (FAO 1949b, p. 26).[17] In these early years, the FAO utilized the U.S. survey, and other dietary surveys that were conducted in "less developed" areas (such as in India, Java, French West Africa, and Gambia, FAO 1949d, p. 10, p. 60), to disseminate information on dietary habits, famine, and malnutrition to numerous groups, organizations, and nation-states around the world.

The development of 'dietary standards', 'recommended dietary allowances', and 'food composition tables' not only assembled food according to emerging ideas about 'types' and 'composition' but helped to produce what increasingly became viewed as 'global' knowledge on food availability and consumption practices. In this way, new measurement techniques, influenced by the biological and physical sciences and shaped by Taylorist claims of standards and efficiency, reassembled food to 'intervene' on the particular problem of hunger. For example, following WWII, the FAO took the responsibility to engage in periodic appraisals of what it refers to as 'the world food situation'. These appraisals involved mechanisms of monitoring food such as the use of 'food balance sheets' for individual countries. The preparation of food balance sheets required three steps: (1) the collection of data on available food supplies by governments; (2) calculation of the amounts of the various foods and food groups available on a per capita basis made by dividing the total supplies by the number of people in the population; and, (3) calculation, based on step 2, of the calories and certain nutrients available on a per capita basis (FAO 1953, p. iii). As such, food balance sheets constituted a key source of worldwide information on food supply and consumption levels. They provided international and nation-wide information on: the quantity of each raw food product produced for human and nonhuman purposes; the total supply remaining for human food; the supply per capita in kilograms per year; and, the average nutrition value per capita per day in terms of total calories, proteins, and fats (FAO 1949b). Such monitoring mechanisms were used to make a "rough assessment of the adequacy of total available supplies in relation to the needs of the people" and to "indicate the direction in which food supplies need to be adjusted" (FAO 1949b, pp. 3-4). The publication and dissemination of nation-based food balance sheets subsequently served to alert member nations of food scarcities and the necessary redistribution of food at global scales.

Disciplining nation-states to adopt these new assemblages of food did not necessarily come easily. Specialists working within the FAO soon recognized that

food balance sheets could not be "satisfactorily used to make valid and comparable estimates on a world-wide basis, because of differences in various countries and regions in the analytical methods employed for determining food composition and in procedures for computing calorie and nutrient values" (FAO 1953, p. iii). What followed was an emphasis on scientifically computing the composition of the world's food products according to their specific constituents which could then be plotted, compared, and subject to judgment in internationally recognized Food Composition Tables (FAO 1953, p. 3; 1948b, p. 1).

As early as 1946 the FAO argued that if food was to be expressed in terms of its constituents (such as water, nitrogen, fat, ash, and fiber) and its protein, carbohydrate, and caloric values, 'appropriate' food composition tables were needed. These tables assembled a wide array of foods, ranging from numerous cereals, starches, and sugars, to pulses, nuts, seeds, and fresh vegetables, and categorized these foods according to their calories, proteins, and fat, and in terms of their 'retail weight' (FAO 1953, pp. 9-11). These and other measurement techniques for computing food values were constantly improved so as to achieve 'uniformity and comparability' (FAO 1948b, p. 2). The entire farm-to-table process was subject to the rigour of an assembly line evaluation:

> The values used by countries in preparing statistical material for international consideration should be derived by comparable methods, and should represent the nutritive value of food at the same stage in the flow from the point of production (farm) to the point of consumption (the mouth of the consumer). (FAO 1946b, p. 9)

In 1949, charts were drawn up to assess and compare the food supplies of 51 countries; in every case the United States remained at the top of the chart while developing countries, particularly those from the region labelled the 'Far East,' lingered at the bottom (FAO 1949a, p. 34). Couched as they were in the language of modern science, such calculations construed social and economic problems in politically neutral terms: 'balance sheets' and 'composition tables' defined nutritional levels and dietary habits as substandard, not people or institutions that perhaps had vested interests in such designations. In this sense, the scientific calculation and charting of food and agriculture became a particularly effective technique for governing the hierarchies of consumption and production throughout the world.[18]

While relegating notions of food to specific dietary constituents and caloric values reshaped consumption practices, imagining food as a global commodity greatly transformed how it should be produced and exchanged. Mobilizing the international trade of food called for the invention and the conversion of a whole class of goods into commodities for trade and sales. The role of the FAO in developing foods as global commodities to be bought, sold, and improved included new techniques to 'locate' the problems of mobilizing products for the market and the dissemination of scientific knowledge to address them. Forecasting, for example, was adopted as a scientifically-based planning technique, an apparently rational mechanism for 'imagining the future'. In one early effort to forecast the world's future needs, the FAO argued that "the world's total food supplies would have to be nearly doubled by 1980 and trebled by the turn of the century in order to provide a reasonably adequate level of nutrition to the peoples of the world" (Sukhatme 1960, pp. 19-20). The employment of such

measurement techniques produced great concern about the fact that 'underdeveloped countries' were not planning the necessary and appropriate expansion in agriculture (FAO 1949a, p. 2). Yet at the same time it increased demands for more reliable, up-to-date information on the progress of individual nations.

Accurate global forecasting and up-to-date assessments depended primarily on the data produced in national level censuses.[19] It was well recognized by the FAO that censuses provided the major source of statistical information for efficient planning by governments, corporations, and other organizations.

> Whatever planning is attempted for whatever purposes, statistical data are sought as a basis. In consequence of this interest, we find an ever-mounting pressure on agencies responsible for collecting data to enlarge their programs. Needless to say, censuses do not escape this trend, being as they are one of the most important sources of statistical information (Zarkovich 1965, p. 59).[20]

The dictates of rational planning encouraged an unusually high level of scientific control over the census operation. In fact, much of the FAO's planning efforts over the years have been dedicated to producing standardized, scientifically accurate international censuses. Highly Taylorist in orientation, these efforts have required a consideration of censuses in all its dimensions: standardizing time, upgrading the status of maps to ensure the coverage of all geographic zones, preparing questionnaires, recruiting and training enumerators, processors and tabulators, setting up experimental censuses, and planning publicity campaigns. International censuses, in this sense, were not only part of those processes of globalization that depended upon professional expertise and technologies of government (Ilcan and Phillips 2003), but were crucially tied to the scientific management of 'truth' about rural landscapes within post-WWII food governance.

In 1948 the program for the 1950 World Census of Agriculture was produced and disseminated after an earlier draft had been "reviewed by technicians all over the world" (FAO 1948c, p. iii).[21] In the Foreword of this draft, the Director General implores member states to take the census seriously, given "the necessity for internationally comparable statistics" (ibid). The 'scope' of the census was to be global and include "all types of agricultural holdings, including those whose products are consumed primarily by the holder and his family...[and] tribal and other groups which are outside the normal marketing system..." (ibid, p.1). The organization of the census questionnaire itself reflects a measurement-oriented approach to agriculture in its thorough 'vivisection' of the land into meadows, pastures, shrubs, woods, forests, and that which is arable, irrigated or not, rented, owned, under 1 hectare, and over 2,500 hectares. Land is further dissected in terms of the horses (mares, stallions, colts, fillies), mules, asses, buffaloes, cattle, sheep, goats, pigs, chickens, ducks, turkeys, geese, rabbits, bees, camels, llamas, reindeer, elephants, silkworms, and hundreds of crops (with associated reference numbers) that inhabit it.

International agricultural censuses, as a technique of global food governance, required the regulation of 'census agents' according to precise and measurable details. Early FAO documents note that the accuracy of censuses depends on hiring census agents based on their 'intelligence' and ability to collect statistical

information (FAO 1948c). Mobilizing these new subjects in the global governance of food took some time, however. It did not take long (i.e., by the 1960 census) to recognize the problem of 'enumerator variability' as conflicting with the scientific requirement of controlled conditions (Zarkovich 1965; FAO 1969a). On the one hand, enumerators came in handy to explain concepts, ensure compliance (early manuals stress to enumerators that they have the law backing them), and "enforce honesty" (FAO 1969a, p. 2). On the other hand, enumerators apparently had their own ideas about certain questions that could 'bias' the results. Initial efforts to control this problem involved mapping out the most minute tasks of the enumerator in order to clarify when deviance from the proper procedure was evident. Enumerators' duties were described as: following the instructions, reading them again when in doubt, finding the accurate boundaries of the enumeration district, carrying the equipment needed, keeping instruments in good order, keeping a record of the hours worked, visiting each holding assigned, approaching landholders 'in a friendly way and get their confidence,' speaking to them in their language, ensuring that information is complete and accurate, writing the response in its proper place, keeping records clean and legible, keeping in touch with the supervisor regularly, signing the document declaring strict adherence to the instructions, respecting confidentiality, and carrying out the work alone since the presence of others 'is usually harmful' (FAO 1969, pp. 3-4). In instructions for the 1960 census, a chart was also drawn up to show detailed variations in census material, by country (i.e., whether the census questionnaire was a book, pamphlet, mimeographed, or not printed at all, its number of pages, and the content of its instructions). Training centres for enumerators were set up to standardize training procedures of which included detailed agendas and timetables for classroom work and field demonstrations. The supervisors who trained the enumerators were given a thick book outlining the many training procedures that they should follow including, in true Taylorist fashion, how they should introduce themselves.[22]

Citing the difficulties of the 1950 World Census of Population and Agriculture, FAO statisticians began to note the need for new measurement techniques, given the 'non-existence' of knowledge about data processing methods, materials, and facilities. A year before the 1960 census was to take place, statistical specialists lamented: "It would be no exaggeration to say that statistical data processing remains today in a state of infancy. Moreover, there is a tendency to treat the subject more as an art than as an objective science" (FAO 1959, p. 1). The objective scientific approach includes not only "such basic items as editing, coding, classification, error control, etc." (Ibid, p. 2) but the:

> knowledge and appreciation of the scope and coverage of the subject field, the basic points on which decisions must be made, the pertinent factors that must be considered in each decision, and how these factors must be weighed and woven into suitable patterns for reaching the decisions (ibid, p. 2).

The superiority of the statistician-as-scientist is clarified not only in this quote, but in the insistence on employing systematic sampling and sample quality checks, hallmarks of "modern standards in statistical practice" (Zarkovich 1965, p. 10; see also Sastry 1957). While censuses were undertaken by a large number of 'less qualified'

people, sample quality checks were undertaken by 'highly trained personnel' who could assess the magnitude of error in various stages of the census, including the quality of the listing of those to be enumerated, the responses of those enumerated, and the coding and transfer of information to computers, or what was then punch cards (ibid). The concept of statistical sampling in censuses not only decreased the number of enumerators required (and therefore was considered more cost effective) but it confirmed scientific techniques as the sources of 'truth' about rural landscapes throughout the globe. Like measurement charts and nutrition tables, censuses were in this sense effective devices for establishing a new regime of truth regarding the food that the world came to 'know and grow' in the post-WWII years. Such techniques animated the possibilities of governing food beyond nation-states and provided the potential groundwork for 'governing conduct at a distance' in the future.

Conclusion

We would like to conclude our inquiry by recalling our introductory comments and linking them to some general remarks regarding global food governance. We have argued that a re-imagination of food and modern agriculture resulted from historic attempts by the United Nations Food and Agricultural Organization to secure food within the boundaries of global production and consumption practices. Stimulated by Fordist-Keynesian and Taylorist truth claims, this international organization sought to create a stable world agriculture that would eliminate hunger and malnutrition and that would integrate the world to prevent future food crises. It did so in part by generating global trade networks, world markets, and populations with 'purchasing power.' However, these activities were also connected to an extended process of change that required specialists to use measurement and management techniques for governing how food would get produced, marketed, consumed, and monitored on a global scale, a process we have referred to as global food governance. Specifically, we have demonstrated how food and agriculture during the early post-War years were globally re-imagined through the organization's unfolding of dietary models, food composition tables, balance sheets, and census techniques. Derived from the dictates of 'rational planning,' models, tables, and censuses encompassed the production of precise instruments of measurement, which in turn enabled scientific calculations and experiments to be made over vast and diverse cultures and territories.

During this early time period, a remarkable consensus developed within the United Nations system on the possibilities of governing the world in new (specifically less destructive) ways and on the potential of science, and scientific management, to achieve this goal. The project clearly went awry, but one of the reasons that this case is important is because it raises concerns regarding current approaches to food and agriculture. To what extent are contemporary assemblages of food and efforts to 'free the world from hunger' (including neoliberal ones) derived from the colonizing activities of an earlier system? And can the current orientation toward scientific assessment of agro-food systems be considered a technique of governance to produce, circulate, and consume food in 'new' ways? While analyzing local-global commodity chains and examining nation-based attempts to harness domestic food systems are essential for any understanding of the changing international agro-food system, our study indicates that analysts should be equally aware of the other contours of power

that work to constitute and re-constitute the governable global subjects tied to these changes. In making this argument, we are pressing for more focused analytical attention to those public global organizations with tentacles of disciplinary power beyond the market that have recalibrated the world in ways that have impinged upon and may continue to inform current agro-food (and other) systems.

We have offered an entry into understanding international organizations that are involved in mobilizing the culture and imagination of science. Without a culture of science built upon concepts of universalism, comparability, and value-neutrality, and upon specific measurement and calculation techniques, the global imagination of food and agriculture that occurred in the post-war era could not have developed as it did. As we have suggested, these scientific techniques were informed by the truth claims of Fordist-Keyesianism - particularly those claims that emphasized the need for market intervention, and mass production and consumption in order to create social and economic stability - and by Taylorist claims of 'scientific management' that rested on the separation of planning from execution in production processes and that rendered bodies calculable and manageable in the name of industrial efficiency. These scientific imaginations played a critical role in mapping the parameters, qualities, and categories of food, and in mobilizing the expansion of international food trade networks. If the culture and imagination of science have become central resources for the global regulation of commodity production and consumption practices, it has been so to a great degree since the early post-war years. It remains to be seen whether the truth claims for which science has been enlisted today can facilitate, in Appadurai's words, 'collective patterns of dissent and new designs for collective life' or ultimately become part of the history of the global failure to effect change for all those people who remain stubbornly hungry.

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Notes

[1] This is not to imply that all member nations of the FAO have, or historically had, equal say in policy- and decision-making. Ilcan and Phillips (2000) hint at the effects of the Cold War, for example, on how debates were fought (and won) in the United Nations during the immediate post-WWII period.

[2] Elsewhere we have examined the historical role of the UN, and particularly the FAO, in re-aligning rural space through cartographical, numerical and textual techniques (see Ilcan and Phillips 2000; Phillips and Ilcan 2002; Ilcan and Phillips 2003; 2004). We continue these lines of investigation into the contemporary context in our current projects on the FAO (e.g., Phillips and Ilcan 2003) and UNESCO, and continue our research on the politics of development (e.g., Phillips and Ilcan 2000). For this historical project we have relied on the extensive archival data available in the libraries of the United Nations and FAO headquarters.

[3] This is a point that Norman Long (1997, p. 111) elaborates exceedingly well: "'History' is relevant insofar as it is used in the modes of ordering the present and future. If the future is seen as an elaboration, as a continuation of the past, if historically-created interests are perceived and represented as rights that are to be recognized or which function as some kind of Archimedean point for the construction of the future...then indeed history matters. But it matters only insofar as it is used in the making of the future. If this is not the case, if history is disconnected from projects or representations that order the future, then historical events become largely irrelevant. Furthermore, ruptures with the past are often deliberately fostered by theories that set out to define future trajectories through the application of models of economic or cultural change based upon some ideal-typical construction of the past: post-Fordism, for example, manifests such a tendency."

[4] See Goodman and Watts (1994) for a related concern regarding the demarcation of Fordist and Post-Fordist regimes in agriculture. See also Strange (1989) for an early critique (originally 1982) of the methodological pitfalls of regime analysis.

[5] Goodman and Redclift (1991, p. 109) note that the New Deal phrase of 'a car in every garage and a chicken in every pot' epitomizes what they call the fordist mode of consumption "whose diffusion was the foundation of the post-war 'golden age' of capitalist growth."

[6] The Ford empire apparently saw the immense possibilities of implementing a new vision of society in the post-war period. Citing Harris's account (1982, p. 95), Tsutui (1998, p.122) notes Henry Ford II's comment that with WWII: "...it is not only things which have been destroyed. The landscape is littered with wrecked ideas and faiths."

[7] Thus Visvanthen's reference to 'apartheid science' (1988, p. 117).

[8] Symonds and Carder (1973) note how the FAO and agricultural experts discounted Malthusian predictions of widespread famine and malnutrition in the early post-war years by referring to the remarkable possibilities provided by science and technology: "'Recent discoveries', declared the first report of the Interim Commission of FAO, 'have made it possible for all men and all nations to achieve freedom from hunger'" (1973, p. 36).

[9] See Ilcan and Phillips (2000) for a discussion of the FAO within the United Nations system as a significant international organisation for 'rural' affairs. The optimistic idea of having a 'stable' world agriculture failed to recognize, of course, the instability of capitalist markets and the extent to which national and regional politics may influence the production of foods as commodities (see Leys 2001).

[10] The goal of global integration was not unique to the FAO at this time but shared by other United Nations specialized agencies, as well as by the Bretton Woods institutions.

[11] Frank Webster, among others, conceptually links bureaucracies with observation: "Organization and observation are Siamese twins, which have grown together with the development of the modern world" (1995, p. 54).

[12] Robert Reich (1991) draws parallels between the organization of American corporations in the 1950s and military bureaucracies, both set up "for the efficient implementation of preconceived plans...Organization charts graphically mapped out internal hierarchies, starting with the large box at the top containing the chief executive officer, and proceeding downward through levels of ever smaller and more abundant boxes" (cited in Krahn and Lowe 1998, p. 204). The organizational charts of the FAO and the UN fit this description (see, for example, the early UN Yearbooks).

[13] It would be another study to examine the possible historical connections between the FAO's emphasis on regionalism and the observation today of what Watts and Goodman call 'global regionalism' (Watts and Goodman 1997, p. 4).

[14] While there was emerging support for import-substitution in the South (particularly Latin America), the US was increasing its presence by flooding the market with its surpluses. For the former, see Murphy (1989), for the latter, see FAO (1949b). The FAO devoted most of its 1949 Conference to finding "answers to 'surplus' problems that are arising from the inability of deficit countries to pay for food imports" (ibid, p. 3). The FAO's solution was

to act as a liaison between deficit countries and those "seeking to dispose of surpluses on special terms" (ibid, p. 4). These special agreements raised concern within the FAO that they might "inhibit progress toward the organization of a world of multilateral trade and convertibility - a world in which the pervasive price mechanism is allowed to play a useful role" (ibid, p. 7).

[15] This development bears similarity to the way that new information technology radically increased the mobility of various economic units for financial and commercial organizations (Held 1995, p. 128).

[16] More generally, food and dietary studies conducted by the FAO and other specialized agencies of the UN included: (1) enquiries directed at estimating the consumption of food by selected families over a period, including a food inventory at the beginning and at the end of the period, records of food purchases, estimates of waste, etc.; (2) weighing intake of food consumed (and food waste) by selected families, and (3) weighing intake of food by individuals in selected families (UN 1948: 4).

[17] A critical assessment of the historical and contemporary relations among food, families, and society can be found in a study by Beardsworth and Keil (1997).

[18] The tradition of Food Balance Sheets continues today. The FAO posts on their website the domestic production, domestic utilization, and food supply in terms of calories, protein, and fat, for every country and every crop and animal product in the world that is FAO-recognized.

[19] Today this task is managed with new computer technologies that identify potential 'hot spots' of vulnerability; see the work of the Food Insecurity and Vulnerability Information and Mapping Systems (FIVIMS) in the FAO's annual editions of State of the Food Insecurity in the World (SOFI).

[20] S.S. Zarkovich was the Chief of the FAO's Statistics Division, Methodology Branch. According to the Preface of this book, the text is the product of 'lectures given by the author at various Training Centres and Seminars organized by the FAO as part of the preparations for the 1960 World Census of Agriculture.'

[21] See Ilcan and Phillips (2003) for an examination of the role of expert knowledge and 'global technologies of government' in the FAO's launching of international censuses.

[22] The supervisor is told each word to say and even when to pause: "May I have your attention please?" (pause) "It's time to start our training class. As you know, my name is ..... and I am your crew leader". (Hold up your name card)' (FAO 1969, p. 24)

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