Examining the Role of Scientists in Strategies for Local Sustainable Development: Views and Understandings from the Scientific Community. Some Preliminary Results of a Case Study in São Carlos, S.P., Brazil

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Abstract

Agenda 21 exhorts the scientific community to become actively involved in policymaking for sustainability at local, national and global levels, scientific knowledge being regarded as a source of information that aids the better formulation and selection of policies for the implementation of sustainable development strategies. This article presents partial results of research carried out in the town of São Carlos (Brazil) that focused on the potential for the effective generation of solutions to local environmental problems by scientists in the universities and environmental non-governmental organizations, and their uptake by local policymakers. The results revealed that factors internal to the dynamics of the scientific community, as well as those related to university-municipality relations, may hinder such interaction, implying that appeals alone for more participation of the scientific community, as seen in Agenda 21, are insufficient.

The relationship of science with the environment has been primarily descriptive, seeking answers to the question "how does our environment work?", which has tended to result in a predominance of physicalist and naturalist explanations for environmental problems (Grove-White, 1996). But documents like Agenda 21 are appealing to the scientific community to also work on more prescriptive questions ("what should we do to solve these environmental problems or to improve our environment?"[1]), questions which, by their very nature, are inextricably linked to the political arena, and as such, imply the incorporation of other, sociocultural dimensions of the issues.

In June 2000, the Brazilian government launched its national Agenda 21—Agenda 21 Brasileira[2]—which focuses on six themes[3] considered essential to local sustainable development strategies in Brazil. One of the foreseen results of the dissemination of Agenda 21 Brasileira is that it will catalyse the elaboration of local Agenda 21 at municipal level, principally through the mobilization of the diverse groups of social actors necessary for their construction. The scientific community is one such key group identified in both the Agenda 21 that emerged from the Rio-92 Earth Summit, and in the Brazilian Agenda 21, the latter containing a section entitled "Science and Technology for Sustainable Development," in which there appeared numerous calls for the scientific community to contribute to policymaking for sustainable development strategies.

This paper presents some partial findings of a qualitative case study being carried out in the municipality of São Carlos, in the state of São Paulo, Brazil, for doctoral research that had as its main aim the examination of the attitudes and opinions of scientists regarding the role described for them in Agenda 21 as a key partner for the formulation of sustainable development strategies at local level. The research reveals that expectations regarding the spontaneous and willing engagement of scientists in local sustainability issues, as implied by the appeals made to them in Agenda 21, rest on assumptions that downplay the relevance of substantial barriers to co-operation that can exist between local policy and scientific communities, as well as underestimating the degree to which motivational factors internal to the dynamics of the scientific community might hinder such action. Although the research dealt with both these aspects in interviews carried out with local scientists, as well as with local politicians, the results presented here focus on the scientists' perceptions of the issues raised.

Science and Policymaking

It is widely believed that the natural corollary of the fact that modern societies are, in Irwin's (1995, p.3) words, "framed by technological development—in the sense that science and

technology provide many of the material possibilities for modern existence," is that science should also comprise a central input into public policymaking processes. In very broad terms, this line of argument runs as follows: given that scientific and technical expertise is allegedly neutral, objective and value-free, it is a natural "handmaiden to policy" (Collingridge & Reeve, 1986) that is able to "speak Truth to power" (Jasanoff, 1990), and in doing so, apparently depoliticize and rationalize decision making in the policymaking process. Underlying such faith in the use of science for policymaking is not only a type of "rational-comprehensive" model of the policymaking process, in which policymakers, being in possession of all relevant information, and being able to order their values and specify aims and objectives, can make a rational and objective decision (Hogwood & Gunn, 1984), but also at least two myths of scientific expert knowledge: namely, that it yields up "the truth" and that "the experts always agree" (Williams & Matheny, 1995). But renowned studies in the philosophy and sociology of science have pointed to the relative, socially-constructed and transitory nature of scientific theory (inter alia Knorr-Cetina, 1981; Latour & Woolgar, 1996), and studies of controversy in technical decision making (Nelkin, 1971, 1975; Yearley, 1992; Chociolko, 1995; Jasanoff, 1990; Wildavsky, 1997) have shown that disagreement among (scientific) experts is the rule, and not the exception. These are all factors which, because they ignore the cognitive, institutional and historical limitations of both the scientific and policymaking communities, make for an "unsuitable marriage" between the two, according to analysts like Collingridge and Reeve (1986).

An alternative to this rational model of policymaking is the pluralist-incrementalist model.[4] This takes as its basic assumption that the most adequate public policies are the outcome of compromise reached through a process of balancing the interests of the different groups of actors involved, seeking to maximize benefits and reduce the costs for all involved, a process that supposedly guarantees access for all to political life (Ham & Hill, 1984; Williams & Matheny, 1995). Relevant here is the fact that the pluralist perspective does not necessarily attribute a special place to scientific and technical expertise in the decision-making process: in that the process aims for the coordination of the interests of the many actors involved, there is no need "for the type of control where one actor stands above the rest, as insisted upon by the defenders of synoptic rationality. There ought to be a plurality of decision-makers involved in policy, and policymaking ought to make little demand on science" (Collingridge & Reeve, 1986, p.67). At the most then, the same weight would be attributed to scientific expertise as to any other knowledge of the other actors involved. Even so, others allege that precisely because of the diverse and conflicting interests involved in a pluralist model, and because of the ubiquity of complex scientific issues in modern societies, there is a greater propensity to rely on the authority figure of the scientific expert to resolve such "dilemmas of democracy" (Nelkin, 1975).

How does all this sit within the current climate of policymaking in the environmental domain? On the one hand, as we have seen, there are calls for more science to be fed into the policymaking process (as is evident in Agenda 21), and a scientific professionalism is discernible also in some of the mainstream environmental non-governmental organizations (NGOs), pointing to the fact that they too, are seeking the "legitimising" and supposedly "neutral" discourse and evidence of science to sanction their sometimes highly ideological and radical actions (Buttel & Taylor, 1994; Hannigan, 1995). That is, these tendencies are rooted in the rational model camp, where, to date, most environmental policymaking is grounded, given that regulatory, "command and control" type policies predominate (Almeida, 1999; Costa Ferreira, 1993), which are generally based on hard and precise scientific parameters (Wynne, 1996). Yet on the other hand, we see a clear movement in the direction of precaution—particularly present in environmental policymaking in the European Community—in which the transitory, uncertain nature of any scientific knowledge is assumed (and especially the synchronic and diachronic uncertainty intrinsic to most environmental issues), and which in turn implies that policy decisions should precede, in a precautionary way, any supposedly firm, "consensual" scientific knowledge emerging from the scientific community. But this more centralised, principled style of environmental policymaking—often justified by the urgency of the environmental problematique—is also proving to be at loggerheads with incrementalist, pluralist styles of policymaking,[5] precisely because such approaches prioritise compromise with the various actors involved "on the ground," over and above precaution.

Science for local sustainable development: A case study

The case study is being carried out as doctoral research in São Carlos, a town of approximately 200 thousand inhabitants, located in the state of São Paulo, Brazil, 233 km from the state capital, São Paulo city. São Carlos has successfully marketed itself as "The Athens of São Paulo State" because of the presence of two prestigious public universities there (one State, one Federal[6]) and also of two units of the Brazilian Government's Agricultural Research Enterprises (EMBRAPA), a situation which reportedly means that for every 231 of the city's inhabitants, there is one with a postgraduate qualification, at either Master's or Doctorate level (Prado, 1995). In sharp contrast with the town's origins (in 1857) as an important coffee-growing centre of the state of São Paulo, São Carlos has been promoted more famously, from the 1980s, as "The Technology Capital" of Brazil, due to the high concentration of "high-tech" firms there (in software, microelectronics, aeronautics, electronic surgical instruments). Much more recently, and of greater relevance to the present study, the last head of the Town Council's Secretariat for Science, Technology and Economic Development (SMCTDE) declared that the town has the potential to become the Brazilian "Agenda 21 Capital" (SMCTDE, 1999,

p.1), despite the fact that the process of elaborating a local Agenda 21 has not even started in São Carlos, in contrast with a number of other cities in Brazil.

Given that it is the presence of the two prestigious public universities situated in this relatively small town that makes São Carlos stand out on the map, we might presume that the town's scientific community offer potential for the materialisation of viable sustainable development strategies. It is to this question that we now turn, being that it was one of the guiding premises of the research.

Method and procedures

The study involved unstructured interviews with 75 five people: 60 local scientists, 10 politicians and 5 members of organized groups in the community. Prior to this interview phase (which took place, intermittently, between the months of February and August, 2000), a survey was carried out via e-mail, among all members of the São Carlos scientific community that have e-mail addresses posted on the university sites (660 scientists), the prime object of which was to establish which scientists regard themselves to be carrying out research related to the environment. Of the 232 scientists who responded, 65 considered themselves to be involved in research related to the environment, and less than half of these (30) were involved in such research specifically related to the São Carlos region. Many regarded themselves to be carrying out research that is either of a predominantly theoretical nature, being potentially, as several replied, "of universal relevance and applicability". Further e-mails were then sent out to the 65 scientists to request follow-on interviews.

Conducting the research within a constructivist framework,[7] unstructured interview-conversations were carried out, in which a brief preamble, addressing the topics raised in Agenda 21 pertaining to the potential involvement of the scientific community in strategies for sustainable development, was presented to the participant, and from then on, conversation flowed freely and was tape-recorded. Selected issues, concerns and observations raised by one participant would be carried over to the next interview to elicit comments from the next participant, and sometimes to the next two or three interviews. As well as interviewing those initially contemplated by the e-mail survey, each participant was requested to suggest names of persons they considered to be central to the issue.

In what follows, some of the key issues that recurrently emerged in the course of the interviews will be very briefly discussed under topic subtitles.

Sustainable development as a research concern

Despite the fact that the preamble to each interview introduced the issue of the feasibility of the local scientific community's involvement in municipal sustainable development strategies, it was noticeable that very few participants—within and from outside the scientific community—touched on the concept of sustainable development itself, presumably because, as one scientist put it, "it is a concept that is still 'under construction' and so very plastic," a view in consonance with much of the literature on the subject. However, one participant was convinced that most of his colleagues who do use the term do not base themselves on, in his words, "the more holistic meaning of the term that Ignacy Sachs outlines,"[8] a fact which, according to this scientist, has grave, reductionist implications for research related to the theme, and thus for possible policy issues eventually emerging from such research.

In a similar vein, very few participants mentioned Agenda 21, with those participants who did mention it rather guiltily "confessing" that they had never actually read it. There were a few exceptions: one scientist (from an engineering background) who had read the entire document found it to be "extremely boring and repetitive"; a sociologist used parts of the Brazilian version for teaching an undergraduate course, and one ecologist was actually the co-author of a synopsis of the Agenda 21,[9] written in accessible language with the aim of being distributed primarily amongst town councils of the region.

It was noticeable that, on discussing the "research for sustainable development" relationship, nearly all of the scientists spontaneously brought up the question of interdisciplinarity. But on probing this, it soon emerged that there was a sense of obligation to be more interdisciplinary because, as one participant put it:

> You can't get funding these days if you don't in-build some sort of interdisciplinarity— in the form of working with colleagues from other departments or institutions— into your projects. I've had projects turned down due to a lack of interdisciplinarity.

Many participants also referred to the difficulty of establishing a more intense dialogue with colleagues from other areas, some alleging that scientists are simply not trained to work this way, partly because, as one put it, "career pressures foment an insane war inside the academy."

The potential influence that the national research-funding bodies have in instigating changes was also implicitly touched on by the great number of complaints heard from scientists interviewed regarding procedures of academic assessment in which the onus is on the number of papers published in internationally-indexed journals. A recurring belief expressed by many participants (mainly from the engineering sciences) was that research of an explicitly "local" hue was much less likely to be published in such journals, although a smaller group vehemently rejected such an idea, emphasising that practising science is all about articulating the local with the 'universal.' The fact that most of the engineers felt there to be a certain discrimination of their work can in part be explained by the fact that traditionally, scientists from the engineering disciplines publish less in any type of academic journals (Velho, 1997). Even so, the following comment from one participant highlights what many expressed as the existence of a distortion, on the part of the funding bodies, in the privileging of publishing above application, the implications of which are far-reaching for possible changes in science policy for sustainable

development in particular:

> I got in touch with them [the financing body] because the finished work had been approved, published, I even won a prize for it, published it in international journals. But the main relevance of the thing is its application in medium-sized towns in Brazil. I'm willing and able to go to the town councils, install the program, train the personnel, it's just that I can't fund all that, and neither can the town councils, on their own. I didn't even get a reply from them.... So we carry out the research, and as long as it's being published abroad, it's well evaluated, but the moment we talk about application, nothing, no interest whatsoever.

It is of relevance to mention here that these, and other, perceived distortions of the science system in developing countries, have been dealt with by some Latin American intellectuals. For example, Da Silva (1998) expounds the belief that almost all Brazilian environmental science is what he calls "reflexive", in that it seeks to emulate environmental science being carried out abroad. And Toledo and Castillo (1999) note that a hallmark of "underdeveloped science" is its "irrelevance", claiming that Latin American ecology is "underdeveloped" not because it has not attained international standards of research, but because it has been irrelevant for the resolution of the region's problems.

Use of science in local policymaking for sustainability

The assumption that the local scientific community could make a valid contribution to local policymaking and implementation processes with their expertise and research results, went virtually unquestioned by practically all of the participants from the scientific community. Typical examples of remarks made on this topic included:

> I'm not going to expect of a politician, who, for example, could be a lawyer by profession, knowledge on the scientific aspects of environmental issues. I can't demand so much of him [sic]. So, I have to collaborate: it's my role, it's my information, I have to put it to use, and hope that he'll [sic] use it well.

> The point is to generate, with many other researchers, a foundation on which the people who make the policies can base themselves, because otherwise, on what are they going to base themselves when they say 'this environment is polluted'? But how do they know it's polluted, based on what information?

> What's the role of a politician? To develop

> the region, policies for welfare, quality of life etc. And for that, he's [sic] going to have to consult the know-how of the university.

> They were elected, but they don't have the knowledge. They're not specialists, that's the problem.

Only four scientists were more sceptical of the general idea of the use of science and scientific expertise for policymaking, one noting that the scientific community couldn't be expected to "metamorphose overnight into sustainable development policy consultants just because that's what Agenda 21 prescribes—the universities just don't have the resources for that."

Interaction between local government and the two universities

Early on in the research, it became evident that there has existed no on-going tradition of interaction and collaboration between the municipal authorities in São Carlos and the local scientific community. With very few exceptions, all of the initiatives taken by scientists to collaborate had foundered. Many of the scientists participating in the study had unencouraging experiences to relate either of their efforts to approximate local government being met with indifference by the local authorities, or worse still, of having their proposals or results simply shelved, even when the work had been originally solicited of them by local government. But one local politician lamented what he saw as this habitual lack of respect on the part of local government, because "the scientists are putting time, knowledge, professionals, dedication and research resources into the work. You can't just shelve the proposal after all that, without saying anything. That's happened so much here, with scientists from both universities."

One notable case of enormous frustration for scientists in the engineering sciences is the fact that their many proposals made, and projects elaborated, for a sewage treatment system for the municipality, had all come to nothing. Many participants brought up this point as a mark of shame for a so-called "Technology Capital", where, as one scientist explained, "as regards sewage, we're still in medieval times here, because the sewage is deposited, in natura, in the town's rivers." Another scientist commented that sewage treatment is not "glamorous," so it doesn't win votes, hence the authorities' disinterest. But the scientists' failure to intervene on this point locally is in sharp contrast to their involvement in similar projects in many other Brazilian cities.

Although, then, this overall negative picture could be painted about past attempts at collaboration, all participants, without exception, felt that this situation was improving. On justifying this opinion, everyone—scientists, politicians, members of the civic community alike—cited the recent example of the complete overhaul of the town's road system, designed by an engineering scientist from one of the universities. That is, this case exemplified the possibility of collaboration with direct intervention and relative success, but it by no means

represents, according to most of the scientists who brought up the subject, an ideal example of how collaboration should occur, primarily because, according to these participants, the criteria for choosing that particular scientist were entirely non-institutional, a suspicion confirmed by one Municipal Secretary interviewed, when he affirmed that "it wouldn't have been possible if it hadn't been Dr. So-and-So: He has experience as a politician, and practical experience outside the university as an engineer as well." The scientist in question attributed the success of the collaboration to the fact that he had offered a "purely technical solution using the possible technology as opposed to the ideal technology," within a feasible timescale, emphasising too, the advantages of, in his own words, his "less academic, more technical" profile. (This aspect of the pattern of collaboration will be taken up again in the discussion below.)

Other scientists who also cited this example, and who were critical of it, were less critical of the technical results per se, but of the process by which the project had been given high political priority by local government, but that there had been absolutely no consultation with members of the community regarding possible alternatives. This point is of particular relevance for sustainable development, given that, as is explicit in the discourse of the Agenda 21, sustainability can only take root with the legitimate participation of the public in decision-making.

Scientists and politics versus science for policy?

It was inevitable that, on discussing the question of collaboration with local government, issues related to local political ideologies and affiliations should arise, although they did so much less frequently than anticipated. At one extreme, there were the very small minority of scientists who avowed that they would never, under any circumstances, work for past and present local government in the municipality due to an outright clash of political ideologies. At the other extreme, there was a substantial number of scientists who firmly adhered to the notion that, in one participant's words, "the knowledge I generate has no political affiliation, no political colour, and must be put to the service of the community that pays my salary with their taxes."

Despite the plurality of political ideologies evident within the universities, there was indeed a general consensus amongst the scientists that traditionally, a major barrier to university-local government interaction has been the fact that, in a town that has a long tradition of political conservatism, the universities have projected an image of being "a hotbed of left-wing politics."[10] This is not an inaccurate generalisation, particularly in the case of the Federal University, which has always harboured many affiliates to left-wing parties. Frequent and long strikes by teachers and staff have sedimented further still this left-wing politicised image of that University in the town. Thus, an overall impression obtained from these interviews with scientists was that "political value dissensus" (Weiss & Bucuvalas, 1977, p.226) does, indeed, preclude use of their scientific and technical expertise.

It was notable that all the local politicians who participated downplayed this politically ideological element, the Head of one municipal Secretariat (himself a retired academic of high national and international standing) asserting that "it would never cross my mind to take into consideration to which political party a given scientist is affiliated if I need the scientific advice or work." However, the allegation made by another of his political colleagues, namely: that local government should not delegate important municipal planning and projects to members of the local scientific community "because the people elected us, not them," points to a truth in the suspicion expounded by a great number of scientists that local government avoids using the scientific community because of ideological clashes. These scientists were proponents of the idea that, as one put it, science is, by nature "critical, promotes change, and above all, transparency of process, which becomes translated into a potential occupation of political influence." Yet another scientist affirmed that: "The university has proved itself to be competent and efficient, for example in resolving problems in industry, and this does not pass unnoticed by the community and represents a threat to local government, an occupation of political space."

These remarks take us straight to an aspect at the heart of the so-called "knowledge society," in which "knowledge can form the basis for authority; access to knowledge becomes a major societal resource and the occasion for political and social struggles" (Böhme & Stehr, 1986, p.8). Suffice it to say that in contemporary "risk society" (Beck, 1986/1992), the knowledge here referred to is predominantly scientific and technological knowledge.

Pertinent to the topic of the political identity of scientists involved in local environmental politics is the issue of their affiliation to environmental NGOs. Although many of the scientists interviewed professed to be either paying members of one of the three local environmental NGOs, or very supportive of their activities, only around eight considered themselves environmental "activists," some having been founding members of the older of these three NGOs. For these eight, persistent involvement in the NGOs had influenced their scientific research, in the sense that it brought to their attention certain questions, and ways to resolve them, or both. As one materials engineer noted:

I go to the NGO meetings on the look out for potential research questions: It's much more to bring things from there to think about in terms of research. I hear something there and think "Right, I need to think more about that."

One biologist noted that the frontier between her NGO activities and her academic research was very fluid, to the point that when she had children, she:

decided to cut down a bit on the NGO activity, because it was actually duplicating a lot of stuff I do at the university, where I have my formal obligations, obviously. But I always make a point of being in close con-

tact with the movement, but I see myself working for the cause more within the university now.

Two scientists revealed a belief that the NGO gained from their being scientists, because, as one put it, "I can bring more authority, legitimacy, to the political arguments of the NGO, being able to argue the point technically." However, other "NGO scientists" interviewed mentioned that they had made a point of participating in local government-led technical work groups on pressing environmental issues originally forced onto the political agenda by the NGOs, as representatives of the civilian, collective opinion of their respective NGOs, and not merely as specialist "Dr.So-and-So, from the University," despite the fact that the formal invitation had been dispatched to the scientific experts at their university addresses, and not to the NGO. Both these opinions echo that of another scientist who, on describing a participatory planning exercise initiated by the university in a nearby shantytown, asserted that marginalized communities need "qualified spokespersons" who can represent and articulate their interests, and that the scientific community could play this mediatory-advocacy role. This calls to mind the idea posited by Jamison, Eyerman, and Cramer (1990) that political activity in NGOs provides a social space not only for political criticism, but a possible redefinition of new intellectual roles, which, in this case, finds scientists penetrating the formal political arena to articulate the demands of a larger, marginalized group of citizens. However, one of these NGO scientists also pertinently noted that his status as "scientific expert" has always been extremely fluid in relation to his dealings with local government, in accordance with the circumstances of the issue in question, again, echoing similar claims made in the literature on scientific expertise. To quote this participant:

> At the time of the struggle for the landfill, the guys from local government called me "sensationalist" and "alarmist." But I mean to say, they were proposing another rubbish tip in a river basin that's where the local supply of water is! Absurd, absurd! What happens a lot with me is the following: when you attend to their needs, you're Doctor, Professor So-and-So. When you question them, you're "alarmist", a charlatan. So, there's this clear attempt to disqualify, to intimidate.

The very fact that many of the disputes fought by the environmental NGOs in São Carlos have been with local government as the recurrent adversary because, as one NGO scientist put it, "[local government] has always been the worst and most frequent violator of environmental law," has, by the scientists' own accounts, precluded local government from considering these scientists and their NGOs as potential partners for municipal sustainable development strategies. But this scientific activism has, on occasion, been condemned by the university itself: one participant's NGO activism in a legal battle against the local installation of a multinational car-plant led, in his own words, "the university to reprimand me officially, because I was signing all protest correspondence as 'Prof. Dr. So-and-So, of University X' and the university didn't want to be seen as going against the multinational because it could possibly bring in research funding." A scientist from the other university involved in the same dispute, complained that the university passed up the chance to adopt a critical stance regarding "this 'fiscal war' farce which in that instance, bent and broke many state and municipal environmental laws in favour of the multinational."

Discussion

In São Carlos, the local scientific community has not been recruited in any systematic way for policymaking per se, but only for the sporadic use of their technical know-how for the resolution of immediate problems previously defined as such by local government, with the participation of neither the community at large, nor the scientific community. This has meant that in general, scientists predominantly from the engineering sciences have been recruited, a pattern in consonance with the two universities' traditional "hard sciences" image. This almost exclusive use of what Grove-White (1996, p.270) calls "short-term 'policy-useful' knowledge" for "politically driven policy initiatives" excludes possibilities of the use of "research as conceptualisation," which, as Weiss and Bucuvalas (1977, p.15-6) note, is research that "steps back from the immediate policy issue [and] sensitises decision-makers to new issues." New issues potentially of great relevance for municipal sustainable development strategies might include the much-ignored human and cultural dimensions of environmental problems, given that research in environmental sociology points out that for sustainable development policies to be successful, they must have the support from people in the community (Macnaghten & Jacobs, 1997; Hichliffe, 1996).

A number of scientists interviewed for the present study—including from the engineering sciences, as well as from sociology and architecture—have accumulated experience of, for example, researching and conducting participatory processes of policymaking, but notably in other municipalities in Brazil.[11] As one of them noted, "because of the still predominant use of imported technology in Brazil, we have less potential to innovate in the 'harder' projects than in 'action research' in policy management."

Local government's habit of recruiting only an instrumental type of knowledge (Knorr, 1977) for translation into immediate, practical measures points to its view of environmental problems and sustainability as being based on what Grove-White (1996, p.279) has termed the "'given' agenda of physical sustainability challenges and their policy corollaries (changes to transport, energy and agricultural policies, for example)." This view has circumscribed the local scientific community's public role to one that is aligned to the "Technology Capital" image of the municipality, attending principally to the needs of local industry, as well as to the "techno-

logical fixes" of municipal problems.

However, research carried out by Velho (1999) in other parts of Brazil, reached the conclusion that "local systems of research and development have more to contribute for the solution of social problems than to attend to the supposed, and never materialized, demands of industry." Indeed, many scientists interviewed stressed that the strength of local university-industry relations are highly overestimated, mainly due to lack of interest in forging them on industry's part. But it has to be recognised that the very definition of sustainability divulged by the outgoing Secretariat for Science, Technology and Economic Development— namely, that "it means the expansion of the economic capacity of a region, preserving the environmental conditions" (SMCTDE, 1999, p.1)—points to a prevailing tacit model of development resembling the traditional one that prioritises economic, over quality of life, issues (Grove-White, 1996), in which, it could be argued, the "business-as-usual" recruitment of instrumental science and technology is, in fact, coherent.

The interviews carried out for this research revealed that many of the scientists are critical and sceptical of the town's "Technology Capital" marketing image, despite recognising that it is an image dependent upon the presence of the universities. This scientist's words capture what many expressed, the implications for sustainable development and involvement of the community being clear:

> That's just marketing, a title that doesn't benefit the population in general. If you ask anyone in the street, "So, does the Technology Capital benefit you in any way?", the answer'll probably be "no" or maybe "a little." The technology doesn't reach them. But how can it really mean something when we still have large shantytowns, pockets of extreme poverty, high illiteracy rates? I don't think that's the path to promote.

The study also revealed that many scientists feel that the pressures internal to the academic profession discussed above, which determine to keep the local scientific community "on top" in terms of a national and continental ranking of universities, to a certain degree militate against the possibility of their prioritising more local, community research questions. This is because these pressures become translated in the day-to-day routine of scientists as the need to be highly synchronised with an invisible college of peers throughout the world so that their work might be evaluated according, first and foremost, to global standards. Scientists in São Carlos have certainly been highly successful at inserting themselves into these "world spaces of communication" (Dowbar, 1996), both virtually, on the internet, and physically,[12] and it is this success that paradoxically contributes to an image of aloofness that the scientific community seems to convey, commented on by some local government participants.

The communitarian discourse[13] characteristic of the Agenda 21, does not make explicit solutions for new institutional configurations that might forward the building of sustainable development strategies, and it also has little to say about the institutional mechanisms by which a mobilized population might remain mobilized for democratic participation in policy decision-making (Williams & Matheny, 1995). Regarding the meaningful participation of the scientific community and the use of its scientific research for sustainable development—that is, beyond solely instrumental use—it becomes evident that new institutional arrangements need to be put in place not only to reward scientists' involvement in community affairs, but also to encourage the participation of members of the public from the wider community to assess the scientific and technological choices made, of particular relevance in contemporary "risk society."

The last of these two scenarios is far from being realised in Brazil: public involvement in matters of science and technology (S&T) decisions is practically unheard of. But other recent developments that will hopefully contribute to the changes in direction regarding scientists' involvement should be mentioned here. Firstly, at the local level, one of the universities has set up a University-Municipality Extension Centre precisely to articulate community demands with research tendencies, although so far, it has been more successful in working with other municipalities of the region. The other local level development was the creation, in 1999, of the Municipal Secretariat for Science, Technology and Economic Development (SMCTDE, mentioned above), reportedly one of the first of its type at municipal level in Brazil. Although one can question the Secretariat's focus on the recruitment of S&T first and foremost for economic growth, there can be no question that the very existence of the Secretariat constitutes a bridge-building step for local university-municipality relations, as most of the scientists interviewed noted.

At state level, the most prestigious state research funding body (Fundação de Amparo à Pesquisa do Estado de São Paulo—FAPESP), created, in 1999, a new line for research funding entitled "Public Policies"[14] which explicitly aims to encourage scientists to seek out partners in public organizations—governmental and non-governmental—and to direct their research to the needs and aims of these organizations.

Given that the main slogan of the environmental problematique is to "think globally, act locally," one pertinent question, when thinking about the role of scientists in developing countries in local strategies for sustainable development, is how to optimise the articulation of indispensable global scientific communication and entry requirements into the global science system, with local sustainable development demands. It remains to be seen whether local scientists, beyond the small circle habitually dedicated to extension work in the community, will be able to rise to the challenge and accept the assessments of their scientific activities by the "extended peer community" (Chociolko, 1995) of laypeople as being of equal value to those of the "invisible", but greatly influential, world scientific community.

Author's Note

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Endnotes

[1] These questions were formulated thus by Dietz (1995).

[2] All information on the Agenda 21 Brasileira is accessible from the Brazilian Government's Ministry of the Environment web site at http://www.mma.gov.br.

[3] Sustainable Cities, Scientific and Technological Development, Sustainable Agriculture, Regional Integration and Infrastructure, Natural Resources Management, Reduction of Social Inequality.

[4] Hogwood and Gunn (1984) note that the two words "pluralist" and "incrementalist" are often used interchangeably.

[5] See for example, Jordan (1998), who discusses this in relation to the incrementalist style of policymaking traditionally adopted in the United Kingdom.

[6] Universidade de São Paulo (USP), known as the largest (seven campuses throughout the state of São Paulo) and most prestigious public university in the Latin American continent. Many graduates from other Latin American countries enroll in the postgraduate programs at USP. The other university in São Carlos is the Universidade Federal de São Carlos (UFSCar).

[7] The method chosen is fully described in Guba & Lincoln (1989).

[8] Ignacy Sachs (1993) used the term "ecodeveloppement" to refer to a holistic program incorporating social sustainability, economic sustainability, ecological sustainability, spatial sustainability and cultural sustainability. More recently, Sachs (1999) modified this concept to "whole development."

[9] Sato, M., & Dos Santos, J. E. (1999). Agenda 21 em sinopse. São Carlos: Editora da UFSCar.

[10] Indeed, one of the first reported student protests against the dictatorship, in the 1970s, took place in São Carlos.

[11] Some examples being: "Incorporation of sustainability principles and indicators in the formulation of urban policies in small and medium-sized municipalities." "Low-cost housing projects using recycled materials in Franca/SP, Ibiraçi/MG and Jaboticabal/SP." "A socio-environmental evaluation of the occupation and use of the Lobo Reservoir in the municipality of Itirapina, SP"; "Study of the relation between atmospheric pollution and the number of hospital cases of respiratory apparatus illness in the Riberão Preto region."

[12] And this is generally manifest by a high proportion of São Carlos scientists carrying out their doctorate or postdoctorate research in universities and research institutes abroad.

[13] Williams and Matheny (1995) do not make any specific reference to Agenda 21 in their discussion of the communitarian discourse in local politics, although their definition of it (op.cit., p.46-7) as a discourse that "assumes that in a democracy political values are to be hammered out in communities. Human beings come to be human by developing an understanding of the world based upon their participation in the ongoing communication and dialogue characterizing human communities", seems to be entirely in consonance with the many exhortations for "community participation" present in Agenda21.

[14] "FAPESP will support applied research projects that aim to produce and systematize relevant knowledge for the definition and implementation of public policies of significant social importance, to be carried out in partnership with governmental or non-governmental institutions, that will be responsible for its execution" (available from www.fapesp.br, "programas especiais" button, and then the option "Programa de Pesquisas em Políticas Públicas."

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