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3 **The Challenges of Integration:**  
4 **Report of an On-line Consultation among Researchers of the**  
5 **Alternatives to Slash-and-Burn (ASB) Programme**

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49

50 **Abstract**  
51

52 The Alternatives to Slash-and-Burn (ASB) programme is a decade-old, complex, multi-  
53 institutional, multi-disciplinary, multi-site research and development consortium. ASB  
54 applies an integrated natural resource management (iNRM) approach to analysis and action  
55 regarding tradeoffs between global environmental concerns and local rural development  
56 opportunities in the forest margins of the humid tropics. Addressing these issues necessarily  
57 involves analysis at many scales and interaction across epistemologies (knowledge systems).  
58 ASB has been recognized for its success in producing scientific outputs and real world  
59 impacts and as a pioneer in iNRM. But, until now, the consortium has devoted little effort to  
60 understanding its success in bridging scales and epistemologies. To fill this gap, an on-line  
61 consultation was held involving 42 ASB researchers and structured following an analytical  
62 framework on “harnessing science and technology for sustainability” developed by Harvard  
63 University researchers based on their studies of other comparable cases. This analytical  
64 framework includes 4 dimensions of integration (disciplinary, functional, spatial/temporal,  
65 and knowledge) and related challenges of institutional learning and adaptation, fostering  
66 appropriate participation, and managing resource and capacity constraints. A special website  
67 was developed for ASB’s virtual consultation, which was professionally facilitated. This  
68 innovative use of information technology proved to be an effective means of triangulating  
69 perceptions of spatially dispersed researchers. Electronic polling was used to identify areas of  
70 consensus or broad agreement, as well as areas where views diverged. The cases of  
71 divergence received special attention in open ended ‘virtual’ discussions. Results reported in  
72 this paper advance understanding of the scope and limits of a complex international  
73 consortium to integrate information across disciplines, institutions, scales and knowledge  
74 systems. Conclusions emphasize hypotheses that may be of interest to other research or  
75 assessment teams endeavoring to bridge scales and epistemologies.  
76

77  
78 **Keywords:** humid tropical forest margins; integrated natural resource management;  
79 organizational learning; participatory approaches  
80

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113 **I. Introduction**

114

115 The Alternatives to Slash and Burn (ASB) programme increasingly is recognized as a  
116 successful pioneer in research and development on integrated natural resource management  
117 (iNRM) in the humid tropics. For example, the first review of its system-wide programmes  
118 with an ecosystem approach by the Consultative Group on International Agricultural  
119 Research (CGIAR) concluded that “The Alternatives to Slash and Burn Programme has gone  
120 further than the others in relating its research sites to the whole area over which the problem  
121 occurs, and in scaling up to the global level in its findings on tradeoffs ... This is very helpful  
122 for the global debate on sustainability issues” (CGIAR 2000, p. xix). And, according to a  
123 May 2003 World Bank report, “ASB has been applauded ... for innovative field research,  
124 strong science, and for going furthest within the CGIAR toward implementing effectively a  
125 holistic, ecoregional approach founded on in-depth local research linked methodologically  
126 across long-term benchmark sites around the world to permit effective scaling up to global  
127 level. The intellectual value of this work has derived from the synthesis afforded by careful  
128 methodological coordination across sites on different continents, and close working  
129 relationships with ARIs [advanced research institutes] and NARS [national agricultural  
130 research systems]” (Barrett, 2003, p. 15).

131

132 In their review of “institutional challenges for harnessing science and technology for  
133 sustainability,” Clark et al. (2002, page 6) conclude that the challenge of “integration” in  
134 various dimensions “has arguably become the clarion call among advocates of sustainability  
135 science”. ASB partners have produced more than 500 scientific publications and important  
136 real world impacts since consortium activities were launched in 1994. To date, ASB has  
137 concentrated on producing these scientific outputs (e.g., the ASB matrices), but has devoted  
138 much less attention to understanding and documenting the processes and institutional  
139 innovations that have made this possible. Of ASB’s 500 scientific publications, only about  
140 five focus on organizational process issues (Bandy and Swift, 1995; Gottret and White, 2001;  
141 Liu, 2003; Sanchez et al. 2004; and the present paper).

142

143 One of the keys to ASB’s success likely has been this focus on scientific output and on  
144 results. But ASB scientists have not taken much time at all to think about “how we do it”.  
145 Now that ASB is being viewed by some as a research and development prototype for  
146 integrated natural resources management (iNRM), people may want to know how ASB does  
147 things. But what helps the ASB consortium to be successful? And what are ASB’s  
148 weaknesses? In addition to direct value to participants in the ASB consortium, insights on  
149 ASB’s processes also may be relevant for the Millennium Ecosystem Assessment (MA) and  
150 other integrated assessments seeking to address this “challenge of integration”.

151

152 **II. Background on the ASB Consortium**

153

154 ASB is the only crosscutting assessment approved by the MA (for more information, see  
155 Tomich and Palm, 2004). The consortium works at the nexus of two important problems:  
156 tropical deforestation and human poverty. Deforestation is often blamed on the slash-and-  
157 burn practices of migrant smallholders, millions of whom do clear and cultivate small areas  
158 of forest by this method. However, other groups also are involved, including plantation  
159 owners, other medium- and large-scale farmers, ranchers, logging groups and state-run  
160 enterprises and projects. These groups often clear much larger areas, leading to conflict with  
161 traditional users.

162 ASB was conceived at a workshop in Brazil just after the UN Conference on Environment  
163 and Development (UNCED) meeting in Rio de Janeiro in 1992. It was launched in 1994 as a  
164 system-wide program of the Consultative Group on International Agricultural Research  
165 (CGIAR) and is convened by the Nairobi-based World Agroforestry Centre (ICRAF). ASB is  
166 a global partnership of over 50 institutions around the world. The goal of ASB is *to identify*  
167 *and articulate combinations of policy, institutional and technological options that can raise*  
168 *productivity and income of rural households without increasing deforestation or undermining*  
169 *essential environmental services*. Although there are some opportunities to reduce poverty  
170 while conserving tropical forests, tropical deforestation typically involves tradeoffs among  
171 the concerns of poor households, national development objectives and the environment.

172 Through its network of sites that spans the humid tropics, ASB ensures that its global  
173 analyses are grounded in local and national realities. ASB's thematic working groups--on  
174 biodiversity, climate change, agronomic sustainability and sustainable land use mosaics,  
175 economic and social indicators, and global synthesis of implications for policy, institutional,  
176 and technological options--develop innovative methods as needed and ensure that data are  
177 comparable across sites. (For more information, please visit the ASB website at  
178 <http://www.asb.cgiar.org>.)

179

## 180 **2.1. The iNRM Paradigm**

181 ASB has made seminal contributions to the evolving integrated natural resource management  
182 (iNRM) paradigm employed by the CGIAR and its partners. This INRM model is  
183 characterized by a process-oriented, systems approach at multiple scales, with participation of  
184 multiple stakeholders and an emphasis on measurement and scaling of tradeoffs and impacts  
185 across alternatives (Figure 1). Although the iNRM approach remains in its early stages, the  
186 following characteristics have been identified by ASB as integral components of the process:

187 *Problem analysis.* iNRM in ASB starts with problem analysis. An integrated analysis of a  
188 broad range of land use alternatives must quantify the local, national and global benefits they  
189 entail as well as the institutional realities that may favor or hinder their further development  
190 in three distinct dimensions: (1) enhanced **human well-being**, (2) enhanced **ecosystem**  
191 **integrity** and resilience, and (3) enhance **productivity** of land and labor.

192 *Analysis of trade-offs across ranges of flexible options.* ASB researchers summarize the  
193 indicators of local, regional and global benefits of a range of land use options in a matrix  
194 format, and then analyze the trade-offs and synergies for a range of management intensities  
195 within the major systems (Tomich et al. 1998). For the land use practices that are attractive  
196 from a local economic perspective as well as a global environmental perspective, we analyze  
197 the various factors that influence farmer decision making, including the economic and  
198 institutional (dis)incentives provided by current policies.

199 [Figure 1 goes about here.]

200

## 201 **2.2. Multiple scales**

202 ASB works at a range of scales, including the global, continental, national, benchmark (or local),  
203 watershed, community, and farm/household levels, with initial focus on the local, farm and  
204 household levels and current focus on intermediate scales (watershed) and global relevance  
205 (Palm et al. 2000). The **global level** consists of the humid tropical broadleaf forests and  
206 deforestation fronts of the three continents. It is at this level that data are ultimately integrated  
207 for identification of global trends and differences and for extrapolation purposes. The three  
208 **continental areas** comprise the forest margin zones of Southeast Asia (Montane and Insular),

209 Latin America (the Amazon Basin), and sub-Saharan Africa (the Congo Basin). Within each of  
210 the continents we focused on a few countries with high (past/current) rates of deforestation  
211 (Brazil, Cameroon, Indonesia, Peru, Philippines, Thailand) and these were classified according  
212 to broad agroecological zone. At the local scale within each country, **benchmark areas** were  
213 selected where the intensive fieldwork was conducted. Within the benchmark areas a number of  
214 **communities/villages** were chosen to represent a range in demographic conditions, land-use  
215 histories, and land-use typologies. The **farm or household** refers to the unit of study within the  
216 community. Finally, many of the indicators are expressed at the **plot** (land use) level.

217 Explicit use of nested scales is important for a) sampling methods for quantitative data collection  
218 based on initial typologies and strata and helping to refine them for further work, b) recognition  
219 of the ‘scaling rules’ for quantitative properties used in the various criteria and indicators and the  
220 impact of differences between scaling rules of the various indicators on the perceived trade-offs,  
221 and c) understanding of needs of specific users at various scales (e.g., farmers and local  
222 communities; national policymakers) linked to these tradeoffs.

223

### 224 **2.3. Multiple epistemologies**

225 ASB is primarily a problem-driven research consortium. Thus scales of analysis and  
226 reporting were defined with reference to specific user problems. ASB users’ needs are  
227 explicitly recognized at the level of the household (farm), local (sub-district or equivalent)  
228 government and provincial or national government, through active dialogues. In some cases,  
229 the process of identifying the appropriate scale for analysis and reporting has been a research  
230 activity in itself extending over a period of several years.

231 ASB employs a number of highly practical approaches to bridge scales as well as the various  
232 knowledge systems involved (local knowledge in rural communities, policymakers’  
233 knowledge, and scientific knowledge). These approaches draw on the literature on  
234 indigenous knowledge and environmental learning (especially work by F Sinclair and L  
235 Joshi), integrated natural resource management (Campbell and Sayer 2003), policy research,  
236 and negotiation support (Van Noordwijk et al. 2001). Several of these approaches owe much  
237 to earlier work on farming systems research (e.g., Byerlee et al. 1982; Collinson, 2000) and  
238 participatory methods (e.g., Chambers et al. 1989). More recent literature on boundary  
239 organizations (Guston 2001; applied to ASB by Liu 2003) is quite relevant to the potential  
240 mechanisms of transmission of information among local communities, scientists, civil  
241 society, and policymakers. There are strong divergences among the views of these different  
242 groups (documented for the ASB Peru case by Fujisaka (2000)). For a problem domain in  
243 which tradeoffs and conflicting interests are rife, conflict management is a major challenge,  
244 specifically regarding scope for developing and distributing relevant knowledge across  
245 groups with conflicting interests. A major outcome of ASB activities has been a contribution  
246 to policy dialogues at the local and national level on the ways ecosystem functions can be  
247 maintained in the context of development. For example, official recognition of the valuable  
248 role of agroforests and other sustainable land-use systems at a national and local level  
249 provides a first step towards empowering the farmers that understand and manage these  
250 systems.

### 251 **III. Methods for Process Documentation**

252

253 As described above, the ASB consortium involves a diverse range of scales, epistemologies,  
254 disciplines, functional roles, and sites spanning the tropics. One prerequisite for documenting  
255 and analyzing the ASB consortium’s processes is to identify an analytical framework with  
256 sufficient scope and flexibility to accommodate this programmatic diversity. Another, even  
257 bigger, challenge is to identify a method to document ASB scientists’ perspectives on ASB  
258 processes and to explore areas of convergence and divergence in their views. Because of the  
259 multiple dimensions of diversity in perspective and place within the ASB consortium, no  
260 single individual or small group can legitimately or credibly lay claim to ‘the truth’ about  
261 ASB. Indeed, it is likely that no two ASB colleagues will have the same view. Moreover  
262 current viewpoints may differ from those involved in the ‘early days’.

263

#### 264 **3.1. Analytical framework.**

265

266 A developing collaboration with researchers in the “Sustainability Science” group based at  
267 Harvard University’s Kennedy School of Government has provided an analytical framework  
268 for analyzing ASB’s approach to “Institutional challenges for harnessing science and  
269 technology for sustainability” (Clark et al., 2002; [www.sustainabilityscience.org](http://www.sustainabilityscience.org)). This  
270 framework, which is derived from analysis of scores of case studies, explicitly addresses the  
271 challenges of integration (disciplinary, functional, spatial, and temporal). Thus it is  
272 particularly well suited as a point of departure for analysis of the ASB experience and would  
273 seem to hold potential for relevance to other efforts to “bridge scales and epistemologies.”  
274 The “Sustainability Science” framework encompasses other elements too -- including  
275 institutional learning and adaptation; participation (both for legitimacy and discovery); and  
276 strategies for managing resource and capacity constraints, with which ASB has considerable  
277 experience. The on-line consultation described below and this paper both follow the structure  
278 of the analytical framework developed in Clark et al. (2002). Short selections from Clark et  
279 al. (2002) were used as background reading for participants at the beginning of each topic.

280

#### 281 **3.2. On-line consultation**

282

283 A consultation “The Truth about ASB” was designed for current participants in ASB and  
284 ASB alumni to contribute their insights based on their experience with four key challenges  
285 that the ASB consortium has faced over the years: integration, institutional learning and  
286 adaptation, participation, and resource and capacity constraints. The virtual consultation  
287 focused on each topic in the analytical framework in turn, testing basic premises and  
288 exploring divergent perceptions.

289

290 Because of the distributed nature of ASB, this collective reflection on ten years of ASB  
291 experience was conducted in a facilitated, asynchronous on-line environment . Based on  
292 previous ASB team experience on-line, a structured activity in an asynchronous, virtual  
293 format had been shown to be an effect means of involving spatially dispersed participants (in  
294 this case five continents). (Participants also had the option of participation by email if they  
295 lacked good access to the worldwide web; however, this proved cumbersome for the few  
296 participants who opted for email participation.)

297

298 On-line facilitation services and ‘Web Crossing’ software enabled the virtual team to provide  
299 input on-line to document ASB processes from various perspectives. This has the great  
300 advantage of triangulating the perceptions of processes and key turning points in ASB’s

301 development from the perspective of the 42 participants. The current ASB Global  
302 Coordinator took the lead in preparing material for polls and discussion. Poll results and  
303 participants' interventions were automatically documented on-line. The results of polls and  
304 insights that were shared on-line are the 'data' for this multi-author publication.

305  
306

### 3.3. Process

307 Two 2-week consultation sessions were designed to solicit the views, ideas and perceptions  
308 of the ASB team about their work and ASB processes. The special website opened for  
309 "virtual" participation on 13 November 2003. A "soft opening" from 13-16 November gave  
310 participants a chance to get oriented. The first session, from 17-28 November, focused on  
311 how ASB grappled with the challenge of integration across disciplines, functions  
312 (institutions), spatial and temporal scales, and different types of knowledge. The second  
313 session, which ran from 12-23 January 2004, covered three other challenges a) has ASB  
314 adapted and learned? If so, how? b) has ASB enabled participation by different stakeholders  
315 and users? c) how has ASB coped with funding uncertainties and other resource constraints?  
316

317 On-line participants could contribute to the "virtual" discussion by posting text on the  
318 worldwide web. The special website was designed to be as easy to use as possible, and the  
319 facilitators assisted participants in getting acquainted with the software, navigating, and in  
320 posting opinions. On-line participants were able to read comments from colleagues and  
321 instantly received results of on-line polls. However, they did not see others' responses until  
322 they had completed the polls themselves.

323

324 For each topic, one or more electronic polls were used to establish a common baseline for  
325 open-ended discussions. The polls consisted of sets of short, provocative questions to which  
326 participants were given five response options: strongly agree, agree, neither agree nor  
327 disagree/don't know, disagree, strongly disagree. Because of cultural differences in views on  
328 appropriate means of expressing disagreement, it was emphasized to participants that while  
329 consensus is fine it also is alright if people disagree as part of a learning process. Questions  
330 and tabulated responses for all polls are included in the Annex.

331

332 Members of the ASB global coordination team reviewed the results of the polls to identify  
333 areas of **consensus** (where no one disagreed), **broad agreement** (where over 75% agreed or  
334 strongly agreed), and of **divergent views** (when 25% or more disagreed or strongly  
335 disagreed). Based on these results, a few key topics were selected to help extend and focus  
336 the open-ended discussions on each topic. In response to feedback after the first session, polls  
337 for the second session were redesigned in an effort to link specific poll questions to  
338 associated discussion topics and to focus participants on fewer threads of discussion. Regular  
339 emails were sent to participants by the global coordination team to review progress, highlight  
340 key points, and stimulate participation.

341

### 3.4. Participation and potential biases

342

343 All current and past ASB Global Steering Group members (the governing body of the  
344 consortium), regional and national facilitators, thematic working group leaders, global  
345 coordination office staff, and other active ASB scientists were invited to participate. A total  
346 of 109 potential participants in these categories were invited by email to participate.  
347

348

349 34 participants joined in the virtual consultation and 8 others chose the email option. The 42  
350 participants are nearly 40% of the potential. No systematic data were collected on reasons for



351 non-participation, but lack of time or conflicts with travel schedules (impairing access to  
 352 email or the web) are the most likely reasons for many and were specifically mentioned by  
 353 several who declined the invitation. The invitation informed potential participants that the  
 354 event was designed with an expectation that they would devote about one hour a week during  
 355 each session. Respondents to an evaluation after the first two-week session indicated that the  
 356 hour per week expectation was reasonable, but many of those respondents also chose to  
 357 devote significantly more time to the event. Respondents to the mid-term evaluation also  
 358 indicated that competing work responsibilities were the main limit to their participation in the  
 359 event.

360  
 361 There was a good balance by gender, country of origin, and length of experience with ASB  
 362 among the 34 on-line participants:

363 15 (44%) are female

364 16 (47%) are from developing countries.

365 20 (59%) are ‘veterans’ with more than 5 years experience with ASB

366 8 (24%) are ‘newcomers’ with less than 2 years experience with ASB

367  
 368 Participants were free to select topics on which to focus their attention and were not expected  
 369 to answer all polls or to post comments in every discussion. The tabulation below indicates  
 370 the number of participants who responded to each poll (poll questions and results are  
 371 appended as annexes to this report).

372

<b>Poll</b>	<b>Questions</b>	<b>Respondents</b>
#1. Integration: disciplinary (part 1)	12	25
#2. Integration: disciplinary (part 2)	11	25
#3. Integration: functional	16	24
#4. Integration: spatial and temporal	18	23
#5. Integration: knowledge	18	24
#6A. Institutional learning and adaptation: Does ASB learn and adapt?	4	19
#6B. Institutional learning and adaptation: How have you learned?	5	19
#6C. Institutional learning and adaptation: Flexibility versus stability	3	17
#7A. Participation: Learning, adaptation and participation	1	18
#7B. Participation: Broadening participation	6	16
#8. Resource and capacity constraints	4	15

373

374 Participants were informed at the outset that, in addition to responding to polls, they were  
 375 expected to contribute a few sentences or paragraphs of their opinions at least twice in each  
 376 of the two sessions. The number of substantive posts ranged from 0 (some participants only  
 377 took polls) to a high of 15. These posts range from a few words to several paragraphs. While  
 378 *quantity* of posts generally is not a good indicator of the *quality* of ideas shared, the

379 subjective assessment of the facilitators (a professional consultant and the ASB global  
380 coordinator) was that the quality of the discussions on-line was high.

381  
382 The 19 contributing authors of this paper are those who posted four or more substantive  
383 comments and/or have contributed text used in this paper. The zero-order draft was sent by  
384 email to the total potential population (including those who participated in the event) in  
385 another effort to seek broad and representative input. Based on responses to that further  
386 opportunity for input, coauthors were added.

387  
388 There are some potential biases in participation that should be kept in mind in interpretation  
389 of the results discussed in the next two sections. Specifically, self-selection may discriminate  
390 against participation by those with:

391 (a) limited access to information and communication technologies—hence against  
392 participants from developing countries. This has been recognized by ASB as a real issue for  
393 several years, but 47% participation by people from developing countries is an encouraging  
394 sign of progress on narrowing the ICT gap.

395 (b) limited familiarity with modern information/communication technologies—hence  
396 possibly introducing an age/experience factor in addition to a developing country factor.  
397 Since 59% of participants are ASB veterans, this does not seem to have been a major issue.

398 (c) busier work and travel schedules. This certainly was a factor, but it is not clear how it  
399 might bias results.

400 (d) less favorable experience with ASB or less enthusiasm for ASB.

401  
402 This last concern likely is the most serious source of bias in the results of the on-line  
403 consultation. Although there is a wide range of experiences, perspectives, and personalities  
404 among participants, it is fair to observe that most are ASB “activists” and many could be  
405 classed as “enthusiasts”. Thus, these results reflect subjective interpretation by a group that  
406 probably is biased toward positive assessments of ASB processes. As such, this activity is no  
407 substitute for an external, objective assessment of the ASB programme. Nor can it be taken  
408 as necessarily representative of the full range of experience of individual scientists who have  
409 participated in the ASB consortium.

410  
411 On the other hand, an analysis based on input from more than one in three of the potential  
412 population is far superior to the perspective of an individual or a small group. The use of  
413 polls followed by facilitated discussion also helped to structure the discourse in ways that  
414 triangulate perceptions of different participants and minimize dominance of any individual  
415 view.

416

## 417 **IV. Challenges of Integration**

418

419 Polls and discussions in the first two-week session focused on how ASB has handled the four  
420 main dimensions of integration identified in Clark et al 2002: disciplinary integration,  
421 functional integration, integration across multiple spatial and temporal scales, and knowledge  
422 integration. A fifth dimension, North-South integration, emerged in the discussions. Note:  
423 parenthetic references below are to polls and questions; for example (P1/Q1) refers to poll 1 /  
424 question 1. Questions and results for each poll are included in the annexes.

425

426

### 427 **4.1. Disciplinary integration**

428

429 Out of 23 questions in Polls 1 and 2, there was either consensus or broad agreement on 11 of  
430 them. Noteworthy areas of consensus include the role of dialogue and collaboration in iNRM  
431 research (P1/Q1) and need for a multidisciplinary approach to tradeoffs analysis (P1/Q5).

432 There was overwhelmingly agreement that a clear problem definition is key to  
433 multidisciplinary success (P2/Q9) and of the value of joint field visits and benchmark sites in  
434 achieving disciplinary integration (P2/Q9,10,11). There also was broad agreement about  
435 difficulty in balancing research and impact (P1/Q7), that ASB is a successful example of  
436 iNRM (P1/Q9), and that ASB partners share a clear problem definition. These areas of  
437 consensus and broad agreement among ASB participants fit well with what other people say  
438 about iNRM in general and ASB in particular.

439

440 Polls 1 and 2 also included 4 clear cases of divergence in views (P1/Q4,12 and P2/Q5,7).  
441 28% did not agree that a lack of institutional rewards is a barrier for collaboration (which is  
442 encouraging, although not the majority view). More disturbing, in light of the broad  
443 agreement on problem definition mentioned above is that 37% (8 people) do not feel ASB  
444 partners have a shared vision on scientific priorities. The issue of priorities and priority  
445 setting recurs below in other dimensions of integration and would seem to be an important  
446 area of divergent views that needs deeper investigation.

447

448 The polls supported the view that ASB is a successful example of iNRM and participants  
449 broadly agreed that a multidisciplinary approach to tradeoffs analysis is key. But questions  
450 for more detailed discussion focused on how this success came about: are there ‘secret’  
451 ingredients to ASB’s success or does success in bridging disciplines basically derive from  
452 common sense and persistence?

453

454 What can we say we’ve learned about ASB’s experience with bridging disciplines?

- 455 ■ The need to forge a “common language” makes cross-disciplinary work more  
456 complicated.
- 457 ■ The key to successful interdisciplinary research may rest with defining the question to be  
458 answered so that each discipline can contribute to the answer from their own aspect  
459 without slipping into researching separate questions.
- 460 ■ When exploring where the discipline comes from to achieve this, participants pointed to  
461 the importance of leadership and shared problem identification. Some steps that were  
462 mentioned are: 1) collective debate and agreement on objectives and routes to reach them;  
463 2) strong but flexible leadership to keep the team on the agreed path; 3) specialist team  
464 members apply their own particular skills to their part of the problem, while remaining  
465 aware of the big picture and the ways in which their research interacts with and  
466 complements others.

467  
468 Discussants considered what indicators of success or weakness in integration would be useful  
469 for ASB and whether disciplinary integration could be measured. It was posited that  
470 convertibility of data units across disciplines (common units) or at least mutual intelligibility  
471 is both a necessary condition but also could be one indicator of disciplinary integration. The  
472 ASB matrix approach (Tomich et al. 1998) is one such integration tool; various columns in  
473 that matrix can be viewed as the domain of a particular discipline and development of  
474 methods and measurements often were conducted by disciplinary teams. But each column  
475 has units clearly identified, with disciplinary integration taking place across columns that can  
476 be understood by various disciplines.

#### 477 478 **4.2. Functional integration**

479 There was either consensus or broad agreement on 9 of 16 questions in Poll 3 on functional  
480 integration, including consensus on ASB's relative success in linking research and policy  
481 processes (P3/Q8), on promoting collaboration across government agencies (P3/Q10), and the  
482 importance of focusing on users' needs (P3/Q12). In a particularly interesting series,  
483 (P3/Q13-16) there was considerable agreement (but not 75%) that tension between global and  
484 local issues existed initially, but no clear agreement on whether or not this had declined  
485 (14/24 – 58% neither agreed nor disagreed). However, there was consensus that ASB's  
486 governance structure, the Global Steering Group, helps address these tensions through a  
487 balanced representation of institutions from 'North' and 'South'.

488  
489 There were 4 cases of very strong divergence of perspectives in the poll on functional  
490 integration. As with disciplinary integration, shared priorities (or lack thereof) seems to be an  
491 issue for further discussion regarding development priorities and outcomes (P3/Q4-5). There  
492 also were differences in perspectives about payoffs to engagement with international  
493 conventions (P3/Q9) – with 50% favoring more linkages -- and ASB's long term links with  
494 forestry and agriculture ministries – with a split between those who may view these efforts as  
495 wasted because real power rests elsewhere and those who do not agree.

496  
497 The importance of long-term commitment to functional integration (integration across  
498 institutions) emerged as a key factor during on-line discussion. Functional integration was  
499 identified as particularly difficult for ASB given the number of different and in some cases  
500 competing institutions involved. The objectives of an institution can be difficult for  
501 individual scientists to transcend, and this needs to be taken into account in the planning  
502 phase of a project.

503  
504 The long-term involvement of many ASB scientists and its importance both for functional  
505 and disciplinary integration was noted in the discussion, but questions remained: how did this  
506 happen, especially since there is nothing to guarantee such commitment at the institutional  
507 level and much that would tend to interfere? Participants contributed points about the *spirit* of  
508 integration, which emphasized efforts to share problems, knowledge and resources.

509  
510 How does ASB create a 'spirit' of disciplinary integration? By attracting the right people? By  
511 incentives for those people to work together? Other means? One common problem seems be  
512 that the scientists involved in ASB projects rarely are full-time on ASB activities; they have  
513 many other commitments and demands on their time. Finding the balance to ensure that  
514 enough time is available for ASB work is sometimes a problem, and enthusiasm and  
515 momentum may be lost as a result. Developing, agreeing upon, and planning research in

516 accordance with common priorities is not easy given the practicalities that come along with  
517 working on external, often short-term funding.

518  
519 Thus it would appear that this necessary disciplinary integration depends crucially on  
520 functional integration (across institutions). Such long-term resource sharing among  
521 institutions would appear to require special care – institutional partners (as distinct from  
522 individual scientists) will continue to participate and share their resources if they clearly see  
523 the purpose and benefits from an institutional perspective. But the knowledge and interest of  
524 institutional leaders also can influence integration. In Peru, for example, the new Vice-  
525 minister of Agriculture is requesting that ASB Peru scale up its technologies (including  
526 agroforestry) because of concern about climate change.

527  
528 Participants emphasized that the balance of satisfaction among stakeholders could be a very  
529 good indicator of functional integration. But questions emerged regarding the evolution of  
530 stakeholders' perceptions over time: 1) the need to consider different time lags in satisfaction  
531 for different stakeholders; and 2) the turnover of individuals within a stakeholder group may  
532 affect the perception of the extent of functional integration.

533  
534 There was broad agreement in the polls about the difficulty in balancing research and impact.  
535 Yet impact in the “real world” ultimately is why ASB works with farmers and national  
536 policymakers. Participants were keen to discuss what impact means for ASB and how it can  
537 be achieved and measured. With respect to impacts, there was a need expressed to explore  
538 ASB's shared priorities (or lack thereof) regarding development outcomes. A deep discussion  
539 ensued on ASB's impacts at various scales, and one that has yielded some very interesting  
540 insights, including:

- 541
- 542 ▪ It is important to distinguish clearly between ‘progress indicators’ and ‘impacts’. Impacts  
543 are the ultimate indicators regarding progress on ASB goals: reducing poverty, improving  
544 food security, enhancing environmental sustainability; these are long term (say a 10 year  
545 time frame).
  - 546 ▪ Discussion focused on identifying tangible impacts of ASB's work, e.g. slowed  
547 deforestation at benchmark sites, significantly improved livelihoods of farmers, etc.
  - 548 ▪ Some of the most important impacts are not the ones that can be readily counted. Real  
549 impacts may often be difficult to measure, and may only be quantifiable after many years,  
550 but this does not mean ASB should take the easy way out and simply revert to  
551 cataloguing progress indicators.
  - 552 ▪ One outcome on which ASB puts a lot of emphasis is changes in perceptions of options  
553 and in land use decisions. ASB's emphasis on knowledge generation aims to create a  
554 medium to share alternative individual perspectives (farmers, policymakers, and others).  
555 Many of the affected individual perspectives include the ASB scientists themselves.  
556 Fieldwork and field visits with farmers often provided the most important insights in how  
557 to make research relevant. Questions here include: how to measure or even to “observe”  
558 these changes in people's ideas? How can one link these changes to ASB outputs?
  - 559 ▪ Working with multiple national partners and individuals within these organizations helps  
560 assure institutional continuity of ASB. In addition to high-level officials, many younger  
561 and mid-level scientists are part of ASB activities. Although heads of organizations may  
562 change with the political winds, numerous participants provided a stable foundation to  
563 maintain and support ASB related work.

564     ▪ Liu’s (2003) study argues that ASB’s pathways for impact are multiplied by disciplinary  
565     integration and that this integration also may facilitate so-called ‘double-loop learning’  
566     across scales of activity.

567

### 568     **4.3. Spatial and temporal integration**

569     Echoing what external reviewers have observed about ASB, there was consensus or at least  
570     broad agreement in Poll 4 that ASB benchmark sites still are appropriate (P4/Q1) and  
571     representative of important ecosystems and problems (P4/Q2-3). However, there was strong  
572     disagreement (56%) that the benchmark sites were barriers to spatial integration, which also  
573     is a plus for the approach. There was a strong consensus that intermediate scales – landscapes  
574     and watersheds – are important scales for iNRM research. There was little agreement on  
575     questions about how long ASB took to scale out (P4/Q4) and significant disagreement (28%)  
576     that the multi-scale approach required 10 years (i.e. a long time) to implement.

577     Questions on ASB time frame (P4/Q14-18) produced some very provocative and strongly  
578     divergent views. Half of the participants disagreed that ASB is driven by a short-term urge to  
579     “get on with it” instead of focusing on future generations (P4/Q14) and this split also carried  
580     through on other short term questions about urgency of needs of the poor (P4/Q15) , but to a  
581     lesser extent regarding urgency of needs of policymakers (P4/Q16). Interestingly, there was  
582     a strong consensus that ASB is driven by short term funding cycles and shifting donor  
583     priorities (P4/Q17) and 67% felt that ASB partners lacked tools for medium to longer-term  
584     time scales (P4/Q18). So it seems that participants have some issues about temporal  
585     integration that merit deeper discussion.

586     There is support for a forward-looking approach – but in the absence of specific analytical  
587     tools, is judgment and intuition enough to guide ASB? And how can we maintain long-term  
588     consistency in our approach (what our colleague Tatiana Sa aptly calls ‘thematic  
589     sustainability’) in the face of short-term funding constraints? These issues will be taken up  
590     below in section 5.3 on resource and capacity constraints.

591     The discussion of spatial and temporal integration revisited the initial intent of ASB design  
592     (Palm et al. 2000; Sanchez et al. 2004) and considered how these approaches have played out  
593     at different ASB sites. The temporal scale was built into the design of ASB in several ways:  
594     one by chronosequences (or land use intensity gradients) and the other by the “snapshots” of  
595     benchmark sites through remote sensing, and even another through the rotation lengths of the  
596     different land use systems. In a similar way, the time dimension was integrated within the  
597     ASB design from the very beginning, at the level of decades as well as the yearly, within-  
598     cycle scale.

599

600     As a consortium of researchers from different institutions working at benchmark sites across  
601     the humid tropics, ASB faces some particular challenges in its work. There was discussion of  
602     ways the variation among sites can be both a strength and a weakness. It was pointed out that  
603     variation is a fact of life for a distributed iNRM project, so the opportunity lies in analyzing  
604     the variation as opposed to transcending it. Land use in the forest margins is particularly  
605     heterogeneous ranging from pasture and annual crops to perennial monocrops, agroforestry,  
606     and forest management. ASB sites were set up to allow for cross-site comparative analysis.  
607     To date, ASB has concentrated primarily on national level syntheses. There has been some  
608     limited cross-site synthesis on specific themes. ASB MA activities are designed to expand  
609     this with the aim of a more comprehensive cross-site synthesis.

610  
611 As indicated by the polls on spatial and temporal\_integration, discussion participants  
612 supported a forward-looking approach, but also noted a number of constraints to this  
613 including short-term funding and the absence of specific analytical tools and capacities within  
614 ASB (e.g. in formulation and use of scenarios). However, there are exceptions. For example,  
615 the ASB Landscape Modeling project in Cameroon specifically addresses land use  
616 projections in space and time. Time is handled through chronosequences over the land use  
617 intensity gradient in the benchmark area, and also at a finer scale in land use dynamics (e.g.  
618 fallow sequences) in individual villages. Spatial issues are handled at two main scales at  
619 present, within individual villages, where many or even all fields are mapped and ownership  
620 and use are known, and at the scale of the benchmark site, where land use mosaics, village  
621 locations, transport networks, and markets all are mapped, typically using participatory  
622 techniques.

#### 623 624 **4.4. Knowledge integration**

625 Questions in Poll 5 on knowledge integration are closely related to topics that will be taken  
626 up below in Part 5 on institutional learning and adaptation and on participation of groups with  
627 conflicting interests. There was consensus that natural resource management problems and  
628 opportunities must be addressed in collaboration with the people who are directly affected  
629 (P5/Q1) and unanimity that local communities can be effective research partners (P5/Q5) and  
630 broad agreement (only 1 of 24 respondents disagreed) that local knowledge is an important  
631 source of information for ASB (P5/Q4).

632  
633 There was divergence of opinion among participants on only one (P5/Q2) of the 18 questions  
634 in Poll 5. In that case, 6 respondents (25%) disagreed with the statement that “ASB takes a  
635 balanced approach to scientific, local, and policymakers’ knowledge”. This is consistent with  
636 the consensus (only 2 of 24 neither agreed nor disagreed) that ASB still needs to develop  
637 additional methods and procedures to integrate different types of knowledge (scientific, local,  
638 policy) (P5/Q3). Just as participatory methods are used in ASB research to understand  
639 smallholders' objectives and constraints, consultation with policymakers also is a hallmark of  
640 this client-driven approach to policy research. The focus of consultation is to obtain crucial  
641 insights from policymakers about their perceptions of problems, opportunities, and  
642 constraints, including institutional mechanisms for policy implementation, in order to guide  
643 the iterative process of research to identify and develop feasible policy options.  
644 Although there was broad agreement (only 1/24 disagreed) that “Working together, scientists  
645 and policymakers can produce better solutions to policy problems than scientists working  
646 alone” (P5/Q17), 12% (albeit only 3 respondents) disagreed or strongly disagreed with the  
647 statement: “To produce relevant results for policymakers, scientists must engage with  
648 policymakers early in the research process” (P5/Q16).

649  
650 Commitment to and perception of benefits from participatory research involving local people  
651 and scientists comes through clearly in the poll results. There was unanimity that “Working  
652 together, scientists and local people can produce better solutions to local problems than  
653 scientists working alone” – here 88% strongly agreed -- (P5/Q15) and consensus (2/24 did  
654 not know) that “To produce useful results for local people, scientists must engage with local  
655 communities early in the research process” (P5/Q14). These views are tempered by  
656 appreciation that local people, policymakers and scientists all face serious time constraints.  
657 Participants felt that knowledge integration is an area where ASB has a lot to offer, as a result  
658 of its participatory research with rural communities, experience documenting local ecological  
659 knowledge, and innovative work in SE Asia to apply techniques for documenting local

660 knowledge to other epistemologies, namely “policymakers’ knowledge” and “modelers’  
661 knowledge”. On the other hand, there was broad agreement that “There are important social,  
662 cultural and political barriers to interaction between local communities and policymakers”  
663 (P5/18).

664  
665 Participants agreed that dialogue and collaboration play a key role in the success of iNRM  
666 work. This led participants to discuss not only *how* to carry out dialogue, but also with *whom*  
667 ASB should be dialoguing. This was linked to the poll results on functional integration, with  
668 its emphasis on bridging policy and research, and on local and global levels. Building on  
669 discussion about multi-disciplinary team leaders, a new thread emerged on the importance of  
670 “bridgers”. It was noted that these bridging leaders need to bring people together as part of a  
671 broader vision, but also ‘translate’ this vision for the team and outsiders to understand. Such a  
672 person doesn’t just acknowledge and give space to other disciplinary contributions but s/he  
673 actually internalizes and incorporates ideas for different sources and viewpoints and comes  
674 up with something totally new. It was recognized that the ASB Global Coordination Office  
675 plays a key bridging role, with people who understand and can translate the scientific  
676 research for different audiences. Questions that were raised (but unanswered) and that may be  
677 worth exploring further include: Does ASB attract (and retain) involvement of its “bridgers”?  
678 Is “bridging” innate, or something learned? Does participation in ASB help build this  
679 capacity? What more could ASB do to nurture “bridgers” and create opportunities to enhance  
680 interactions?

681

#### 682 **4.5. North-South integration**

683

684 Although the four dimensions of integration identified by Clark et al. proved very useful in  
685 structuring the on-line event, an additional aspect of integration emerged in the discussion  
686 that also needs to be considered in the case of ASB: North (“rich”, “developed”) – South  
687 (“poor”, “developing”) integration. Participants noted that power, access and resource  
688 differences are not adequately covered under the existing integration categories. ASB has  
689 found it useful to explicitly recognize these North-South gaps regarding access to information  
690 (application of information technology), access to funding, and in capacities in integrated  
691 natural resource management research, but much remains to be done to close these gaps.

692

693 There are, of course, also North-North and South-South integration issues – such as between  
694 environment/development interests. In this vein, some participants emphasized the  
695 importance of a broader cross-section of institutions in the ASB Global Steering Group  
696 (ASB’s governing body), since the national agricultural research systems (NARS) can by  
697 their nature only represent a slice of “Southern” interests and issues. There was agreement  
698 that, as one participant wrote, “having an effective voice in the fate of programs that are  
699 potentially so related to people’s life helps to build effective participation” but the subsequent  
700 discussion on challenges of participation (section 5.2 below) also revealed significant  
701 divergence of views on how best to approach broadening stakeholder participation.

702

#### 703 **4.6. Clear problem definition, but are priorities clear?**

704 Although there was agreement that ASB shares a clear problem definition, about a third of  
705 the on-line participants feel that ASB partners do not have a shared vision of scientific  
706 priorities. The issue of priorities and priority-setting was a key concern throughout the  
707 discussion of integration. In a sense, existence of differences in scientific priorities is not  
708 surprising when one considers that the first response of a scientist often will be to frame  
709 priorities for work in terms of their own discipline, even if there is a shared understanding of



710 the problem that transcends disciplines. These differences may stem from possible  
711 disconnection between local and global scientific priorities.

712

713 Then there is the (frequent) tension between conservation and development priorities, an  
714 issue raised by several participants. Balancing the tradeoffs between conservation and human  
715 well-being is complicated. Functional integration may be hampered by the narrow structural  
716 imperatives (focused missions) of different agencies and institutions that set priorities for  
717 their own researchers.

718

719 Clear problem definition seems to be the key to integration of scientific knowledge with the  
720 problems local stakeholders face at benchmark sites as well as integration across disciplines  
721 and across functions (institutions). After achieving a clear understanding of these local needs,  
722 it may be easier to integrate disciplines. But then what are the scope and limits of ASB if the  
723 consortium really is driven by the needs of the poor? Because of the comparative advantage  
724 of ASB partners in research on agricultural development and natural resource management,  
725 has ASB been overlooking other “alternatives” for better livelihoods? Early on Beckey  
726 Elmhirst's (1997) findings on gender-specific migration patterns from the degraded Lampung  
727 site in Sumatra pointed at 'urban escape' and 'Greater Jakarta Garment Factories' as the main  
728 'alternatives to slash and burn', but ASB scientists never found a way to effectively follow up.  
729 For most of our partner institutions and for the scientists involved, this level of agility in the  
730 response to our target group would take the work too far outside our respective institutional  
731 domains (and hence individual ‘comfort zones’).

732

733 Many of the forces driving environmental change and natural resource degradation arise  
734 outside the forestry and agricultural sectors (Tomich et al 2004), hence beyond control of  
735 officials in those line ministries. Therefore, impact of policy research on the twin objectives  
736 of poverty alleviation and improved resource management depends on decisions taken by a  
737 wide range of policymakers. ASB has had to develop working relationships with a new set of  
738 ‘clients.’ Similarly, few of ASB’s original research partners had capacity or interest in  
739 policy research. To fill this gap, ASB developed new partnerships with national  
740 organizations active in policy research (including NGOs as well as universities and  
741 government research institutions.)

742

## 743 **V. Other challenges affecting integration**

### 744 **5.1. Institutional learning and adaptation**

745 This topic was the area of greatest agreement among participants. “Institutional learning” is a  
746 process of institutional change and adaptation in response to new information and  
747 experiences. ASB is not a “conscious being,” but ASB may be said to “learn” through  
748 collective progress among ASB scientists in understanding of processes and contribution to  
749 knowledge.

#### 750 *5.1.1. ASB learns and adapts*

751 There was consensus (17 of 19 participants, nearly 90%, agreed) that “ASB learns and adapts  
752 as an institution; i.e. that ASB priorities change in response to new results” (P6A/Q1). This  
753 included consensus that ASB learns and adapts in response to scientific results, lessons of  
754 practical experience, and from “our own successes and mistakes” (P6A/Q2, Q3, Q5) and  
755 broad agreement that ASB adapts in response to better understanding of users’ needs  
756 (P6A/Q4).

757 What indicators can be used to track institutional learning and adaptation? Possible  
758 indicators at the institutional (consortium) level include problem definitions, programme  
759 priorities, and scientific hypotheses. Taking prevailing scientific hypotheses as an indicator,  
760 it can be argued that ASB has gone through at least 3 generations of learning.

761 Following closely on the UN Conference on Environment and Development in Rio de Janeiro  
762 in 1992 (and also derived from Agenda 21), the first generation of ASB could be  
763 characterized as “technological optimism”. The initial perspective could be summed up as:

764           Technological optimism hypothesis (ASB version 1). “Poor farmers destroy  
765 the world’s tropical forests by applying primitive slash-and-burn methods to  
766 grow foodcrops. These unsustainable techniques mine soil nutrients and,  
767 ultimately, these poor farmers must move on to clear a new patch of forest,  
768 with large negative consequences for the environment. This cycle can be  
769 broken through better soil fertility management.”

770 This hypothesis was rejected in the first phase of ASB by studies of forces driving  
771 deforestation at the various benchmark sites in the mid 1990s. From these studies, it was  
772 clear that, among many other things, smallholder productivity growth (precisely the  
773 prescription of the initial phase) could accelerate tropical deforestation by making conversion  
774 to forest-derived land uses more profitable. This was named the “Pandora’s Box Problem”.

775 Version 2 of the ASB hypothesis, which could be termed the “win-win” hypothesis,  
776 elaborated the intensification process and incorporated local institutions, especially those  
777 concerned with land tenure and resource access, and national policies, including  
778 infrastructure and trade and macroeconomic policies. The notion was that the right mix of  
779 technological change, institutional innovation and policy reform at the national level could  
780 achieve development with conservation. But this win-win approach to the deforestation  
781 problem was rejected by the results of the ASB tradeoffs matrix that emerged in the late  
782 1990s, which revealed strong tradeoffs between local and nation development objectives, on  
783 the one hand, and global environmental concerns, such as habitat conservation and carbon  
784 sequestration.

785 ASB now would appear to be in Version 3 (or beyond), where efforts are being made to move  
786 beyond assessment of tradeoffs to management of conflicting interests across stakeholders  
787 and across temporal and spatial scales. In this “negotiation support” era for ASB, emphasis is  
788 shifting from plots and households to landscape level analysis and a new focus on rewarding  
789 rural communities for environmental services that are not valued in the market.

790 With the evolution of ASB hypotheses, there also has been a broadening of perceptions both  
791 of the necessary disciplinary base within the ASB consortium and also the range of  
792 stakeholders, hence potential participants and users. From the “technological optimism”  
793 days, in which soil science, agronomy and other biophysical disciplines predominated, the  
794 mix of ASB scientists has steadily grown to include more ecologists, economists,  
795 geographers, and other social scientists. In parallel, the set of stakeholders has grown from  
796 an initial focus on farmers and NARS partners to include policymakers at various levels,  
797 environmental NGOs and civil society groups. In each case, the process has brought in new  
798 groups – and broader potential scope -- while maintaining important roles for the original  
799 participants.

800

801 *5.1.2. How does learning occur within ASB?*

802 More than whether ASB learns and adapts – apparently it does – the more challenging and  
803 important question is how this happens. Essentially, it appears that ASB creates an  
804 environment where individuals learn. There was consensus among participants on all of the  
805 poll questions regarding specific elements of learning. Among the five questions, the  
806 strongest consensus (63% strongly agreed and 26 % agreed; no one disagreed) emerged from  
807 the statement that “Long-term involvement of scientists at ASB benchmark sites and in ASB  
808 thematic working groups are important elements of relationships that underpin institutional  
809 learning and adaptation” (P6B/Q5). This poll did not attempt a comprehensive review of  
810 opinions on determinants of learning within the ASB consortium. However, there was  
811 consensus regarding all of the following elements regarding ASB:

- 812 • Research set in the local reality of ASB sites accelerates learning (P6B/Q1)
- 813 • Interaction with ASB users (farmers, policymakers) accelerates learning  
814 (P6B/Q2).
- 815 • Development and use of quantitative indicators by ASB accelerates learning  
816 (P6B/Q3).
- 817 • ASB learns from integration of results across benchmark sites (P6B/Q4).

818 Despite the strong consensus, the discussion revealed some tension between local  
819 engagement to frame meaningful research question combined with cross-site syntheses to test  
820 broader hypotheses (and produce international public goods). This iterative process of (a)  
821 understanding change “on the ground” and (b) putting those observations into a broader  
822 context is not straight forward. The tension created between these parallel endeavors appears  
823 to be healthy and may well be a key element driving the learning process for individuals and  
824 more broadly within the consortium. It was emphasized by several participants that  
825 “institutional learning” by ASB as a whole requires investments in “collective learning,”  
826 meaning opportunities for individual scientists to share information within the consortium.  
827 To this end, there were calls for more opportunities for face-to-face interaction among ASB  
828 scientists, particularly within regions (Amazonia, Congo Basin, Southeast Asia) but also  
829 across regions. Such meetings were relatively common in the earlier years of ASB, but have  
830 not been possible to the same extent due to funding constraints in recent years.

831

832 *5.1.3. Flexibility versus stability.*

833 Clark et al (2002, p. 9) observe that the challenge of institutional learning and adaptation “lies  
834 in preserving benefits of durable research programs while introducing incentives for  
835 innovation”. Participants were unanimous (65% strongly agreed; 35% agreed) that “there  
836 needs to be space in ASB for individuals (and institutions) to learn at different rates and to  
837 maintain conflicting opinions” (P6C/Q1). Participants’ emphasis on the need for flexibility  
838 also was reflected in near unanimous agreement (16 of 17 poll respondents) that some  
839 flexibility in priority setting is needed to accommodate different views (P6C/Q2). However,  
840 there also was consensus (albeit a weaker one) that too much flexibility and programmatic  
841 ambiguity can create confusion (P6C/Q3). Scientific rigor was discussed as an effective  
842 balancing principle to flexibility in scientific priorities and research methods. On one hand,  
843 ASB has benefited from reducing ambiguity and flexibility in sampling protocols – and this  
844 has been the basis for subsequent synthesis across sites and testing of generic hypotheses. At  
845 the same time, a flexible approach has been essential in the search for locally-relevant  
846 solutions and interpretation of global issues at the local level. Put somewhat differently, ASB

847 has attempted to steer a middle path by striving for high scientific standards while being  
848 flexible (even opportunistic) about where the scientific results led. It was agreed that  
849 flexibility (balanced by rigor) can be a great asset within a long established team. Somewhat  
850 more surprisingly, flexibility may also help to ease in new comers to the team – although it  
851 probably also requires greater initial effort on their part because research priorities and  
852 methods across benchmark sites are not always obvious to newcomers. For the same reason,  
853 flexibility in research design also may be something of a liability in conveying ASB  
854 messages to an external audience.

855

## 856 **5.2. Participation of groups with conflicting interests**

857 The greatest divergences in views during the consultation appeared in polls on participation.  
858 This may be related to the observation by Clark et al. (2002, p.10) that “there is relatively  
859 little understanding of the tradeoffs involved in participation decisions (e.g., how increasing  
860 public participation might increase political legitimacy, but might decrease the scientific  
861 credibility of the research designed to support the decision making).”

### 862 *5.2.1. Learning, adaptation and participation*

863 There was (weak) consensus that “Broader participation of different groups in ASB  
864 accelerates learning” (P7A/Q1), although 4 (22%) expressed neither agreement nor  
865 disagreement with this statement. The ensuing discussion emphasized the importance of  
866 viewing participation as a means to specific goals rather than an end in itself. Hence, the  
867 need to identify strategic forms of participation derived from prior questions regarding  
868 strategic directions and the current stage of development of the programme. Here, the  
869 discussion established a strong strategic case for engaging with local communities to gain  
870 deep understanding of the ecological basis and rationality of farmers’ practices, as this is  
871 highly relevant for ‘scaling up’ to achieve impact of significant areas for significant numbers  
872 of people in a reasonable time. ASB results and other evidence suggest that farmers’ local  
873 ecological knowledge – their understanding of how ecosystem components function and  
874 interact – are comparable across similar agro-ecosystems; terminology may vary, but the  
875 basic concepts are similar (Joshi et al. 2004). There also was broad agreement about strategic  
876 importance of engagement between scientists and policymakers (Poll 5 on knowledge  
877 integration, questions 10-12). But, as with rural communities, it also must be recognized that  
878 policymakers have many issues competing for their attention and hence little time for  
879 attention to scientists (P5/Q13).

880 Too often in international development literature and practice, participation has been  
881 misunderstood as simply ‘talking to’ people. But the ASB consortium has been increasingly  
882 creative in engaging with different groups in ways that minimize the costs to them in terms of  
883 time and effort. Based on ASB experience, different levels and modes of participation were  
884 identified. In Cameroon, for example, ASB researchers actively sought a balance between  
885 participation and ‘solitary science’. Farmers participated strongly in data collection and  
886 quantification of social indicators, including land tenure. Other researchers participated in  
887 defining model structure and parameters. The actual model building was largely a solitary  
888 process, with periodic interaction and feedback from farmers and other researchers.  
889 Continuous participation of farmers and other researchers in the model building process  
890 might have resulted in a more “realistic” model, but the extra time required (including  
891 participants’ time as well as extension of the modeling timeframe) and in model complexity  
892 would have been severe. This idea of levels or modes of participation extends to other  
893 activities as well (aside from research). Participation can come in the form of specific and

894 distinct (but not mutually exclusive) roles in governance, collaboration, consultation, and  
895 advise or consent, to name a few possibilities. Each of these modes has different costs and  
896 benefits and the distribution of these costs and benefits is uneven for ASB and for our  
897 stakeholders.

### 898 *5.2.2. Broadening participation within ASB*

899 There was consensus that “ASB national and local consortia can become vehicles for  
900 participation by diverse groups within the countries concerned” (P7B/Q1). There also was  
901 broad agreement that ASB, by the nature of the issues it addresses, “often is involved with  
902 stakeholders who have conflicting interests” (P7B/Q5)

903 ASB participants in the consultation either are split on the issue or are of two minds regarding  
904 the desirability and feasibility of broadening participation. 11 of 16 respondents (69%) agreed  
905 that “ASB should reach out to a wider representation of groups within current ASB countries,  
906 including more and different types of local community associations and conservation groups,  
907 local government and civic organizations, local and national NGOs, policymakers and other  
908 officials at various levels” (P7B/Q2).

909 But this seems inconsistent with responses to the next question in that poll. Virtually the  
910 same number (10 of 16 respondents; 63%) agreed with the statement that “Since ASB  
911 collaborators already are overloaded with work, ASB should focus on delivering results for  
912 farmers and national policymakers, who are ASB’s core stakeholders” (P7B/Q3). This is the  
913 only clear case of an institutional contradiction within a poll in this consultation. While some  
914 of this apparent contradiction between idealism and realism (or exhaustion) may result from  
915 the wording of these questions, it is consistent with the divergence in views regarding the  
916 following statements: “There are tradeoffs involved in participation decisions. For example,  
917 increasing public participation might increase political legitimacy, but might also decrease  
918 scientific output” (P7B/Q4). Nine of 16 (57%) agreed or strongly agreed while 4 (25%)  
919 disagreed with that statement.

920 The discussion of this poll also revealed important differences in perceptions of participation  
921 within ASB, which might correspond to different personal or disciplinary perspectives or  
922 engagement in different locations or at different times. Moreover, there was no real  
923 agreement on means for broadening participation or even whether local participation by poor  
924 people in global issues is feasible. For example, over 62% agreed (and the balance disagreed)  
925 with a question (P7B/Q6) based on David Kaimowitz’s (2003) opinion that “It is still not  
926 clear how low income people can participate in a meaningful way in our increasingly global  
927 world.”

928 Throughout the on-line consultation, there was a considerable discussion regarding who  
929 ASB’s stakeholders are. A logical consequence of working on tradeoffs is that ASB is often  
930 engaged with stakeholders who have conflicting interests. And it is very easy to significantly  
931 expand the range of stakeholders beyond those ASB normally thinks about engaging. Are  
932 logging companies and the military ASB stakeholders? Even if these are potential ASB  
933 stakeholders, what does ASB do about it? Are they going to be ‘satisfied’ with ASB’s  
934 tradeoff analysis? How much effort should ASB put into these groups? ASB has an  
935 obligation to make its information available publicly, but how might it proceed in terms of  
936 additional outreach efforts? Are there different techniques for different groups? For some, is  
937 the only way through national and international regulatory authorities and public opinion?  
938 The resource and capacity constraints discussed in the next section have had particular effects  
939 on ASB’s efforts to address appropriate participation.

940

### 941 **5.3. Resource and capacity constraints**

942 There was consensus among participants that despite surviving (even thriving) for more than  
943 a decade, ASB has suffered chronic funding uncertainty and funding constraints (P8/Q1).  
944 These funding constraints slow progress on training and capacity building (P8/Q3). There  
945 also is broad agreement that these constraints also slow scientific progress (P8/Q2). As Clark  
946 et al (2002, p. 11) point out, “the challenge is not merely to mobilize more resources and to  
947 allocate them ... but also to mobilize and allocate in a manner that fosters integration,  
948 adaptation and appropriate participation.” Existence of an integrated ASB global agenda  
949 based on overarching research hypotheses and a clear, shared problem definition contributes  
950 to uses of resources that foster integration and adaptation. In turn, this depends on leadership  
951 and follow-through from the ASB global coordination office, the Global Steering Group, and  
952 regional and national facilitators. Other key elements of this challenge that emerged in the  
953 on-line discussion include dissemination of research findings in ways that raise awareness of  
954 ASB and long term involvement of certain researchers in all ASB countries. The latter, of  
955 course, depends on some long-term consistency in “core” funding which in turn depends on  
956 institutional commitment of their institutions. Balanced institutional representation on the  
957 ASB Global Steering Group across key institutions and between institutions from North and  
958 South is one element in sustaining commitment from partner institutions. Efforts to increase  
959 transparency in decision making within the consortium (especially financial transparency) are  
960 key to building commitment and trust among partner institutions, particularly to carry ASB  
961 through lean years. Expanding, fostering, and deepening appropriate participation –  
962 especially at the local benchmark site level and among national partners who have little or no  
963 funding “slack” – may be the biggest casualty of funding uncertainty. It is all too easy to  
964 raise expectations among local communities and national researchers through consultation  
965 and participatory planning of activities, only to have them disappointed if funding for  
966 proposed activities falls through or is delayed (as it often is). Once this has happened, it is  
967 very difficult to restore credibility of the programme and enthusiasm of the participants.

### 968 **VI. Conclusions regarding integration to bridge scales and epistemologies**

969 Conclusions are summarized below for each of the 4 areas addresses in the online event. This  
970 on-line consultation among ASB scientists proved to be an effective means of identifying  
971 areas of consensus as well as divergence in the views of participants in the ASB consortium.  
972 In the ASB case, the major topics identified by Clark et al. (2002) are interrelated (Figure 2).  
973 The consultations revealed that there are strong interactions between integration *per se* and  
974 institutional learning. Both of these depend crucially on participation, which in turn rests on  
975 (or is limited by) human and financial resources.

976 [Figure 2 goes about here.]

977

#### 978 *Integration*

979 Clear problem definition derived from users’ needs is key to disciplinary, functional,  
980 spatial/temporal and knowledge integration in ASB. Sustained focus on specific sites  
981 facilitated co-location of measurements, which was essential in disciplinary integration. But  
982 there also was a social dimension: professional and personal relationships from shared  
983 problem focus produce continuity and resilience in scientific teams. In ASB’s experience, it  
984 appears that functional integration (among institutions) is more difficult than disciplinary  
985 integration (among teams of individual scientists). On the other hand, governance by  
986 institutions from North and South helps integrate across disciplines and interests – especially  
987 the top-down aspects of global environmental concerns and the bottom-up nature of rural  
988 development. Boundary roles – communication, translation, mediation – are key to

989 integration across functions (institutions) and across knowledge systems and arenas (local,  
990 civil society, policy, science) (see Figure 3). ASB’s global coordination office and its  
991 regional and national facilitators play central roles in ASB’s functions as a boundary  
992 organization (Guston, 2001; Liu, 2003).

993 [Figure 3 goes about here.]

#### 994 *Institutional learning and adaptation*

995 Clear research hypotheses have accelerated organizational learning and adaptation in ASB.  
996 Provisional hypotheses, whether refuted or not, focus efforts on producing relevant evidence  
997 and thereby stimulate adaptation. Development and use of quantitative indicators also  
998 accelerated scientific learning – especially as they contributed to hypothesis testing -- and  
999 facilitated communication across boundaries. Here too, there has been a social dimension:  
1000 continuity of commitment of lead scientists at specific sites and their involvement across sites  
1001 and thematic working groups accelerates the learning process and disciplinary integration.  
1002 ASB’s apparent ability to incorporate new partners (at acceptable transaction costs) has  
1003 facilitated adaptation as new scientific needs emerged. Furthermore, some flexibility in  
1004 research design is essential to create space for individuals and institutions to learn at different  
1005 rates. Flexibility also creates space for scientists to maintain conflicting opinions, which can  
1006 facilitate learning by making possible ‘fringe experiments’ (Senge 1990). And, as noted  
1007 above under integration, performance of boundary roles appears to have accelerated learning  
1008 and adaptation by integrating, translating and disseminating new knowledge across ASB’s  
1009 distributed sites, spatial scales, and disciplinary and functional groups.

#### 1010 *Participation*

1011 Broad participation of strategically selected groups at different scales with different interests  
1012 was viewed as a way to accelerate learning. But it also is not feasible to involve “all”  
1013 stakeholders in a meaningful way, so choices must be made regarding where to invest effort  
1014 to ensure legitimacy and credibility.

#### 1015 *Resource and capacity constraints*

1016 Fostering appropriate participation – especially at the local benchmark site level and among  
1017 national partners – probably has been the biggest casualty of funding uncertainty. While  
1018 negatively affecting both, funding constraints and uncertainty probably have been more  
1019 harmful to capacity building than to institutional learning and adaptation within ASB.

1020 In addition to providing insights about ASB processes, these conclusions also could be recast  
1021 as hypotheses for further testing by other teams. These may hold implications for institutional  
1022 capacities and processes that will be useful for other research or assessment teams working at  
1023 multiple scales and endeavoring to bridge different epistemologies.

1024

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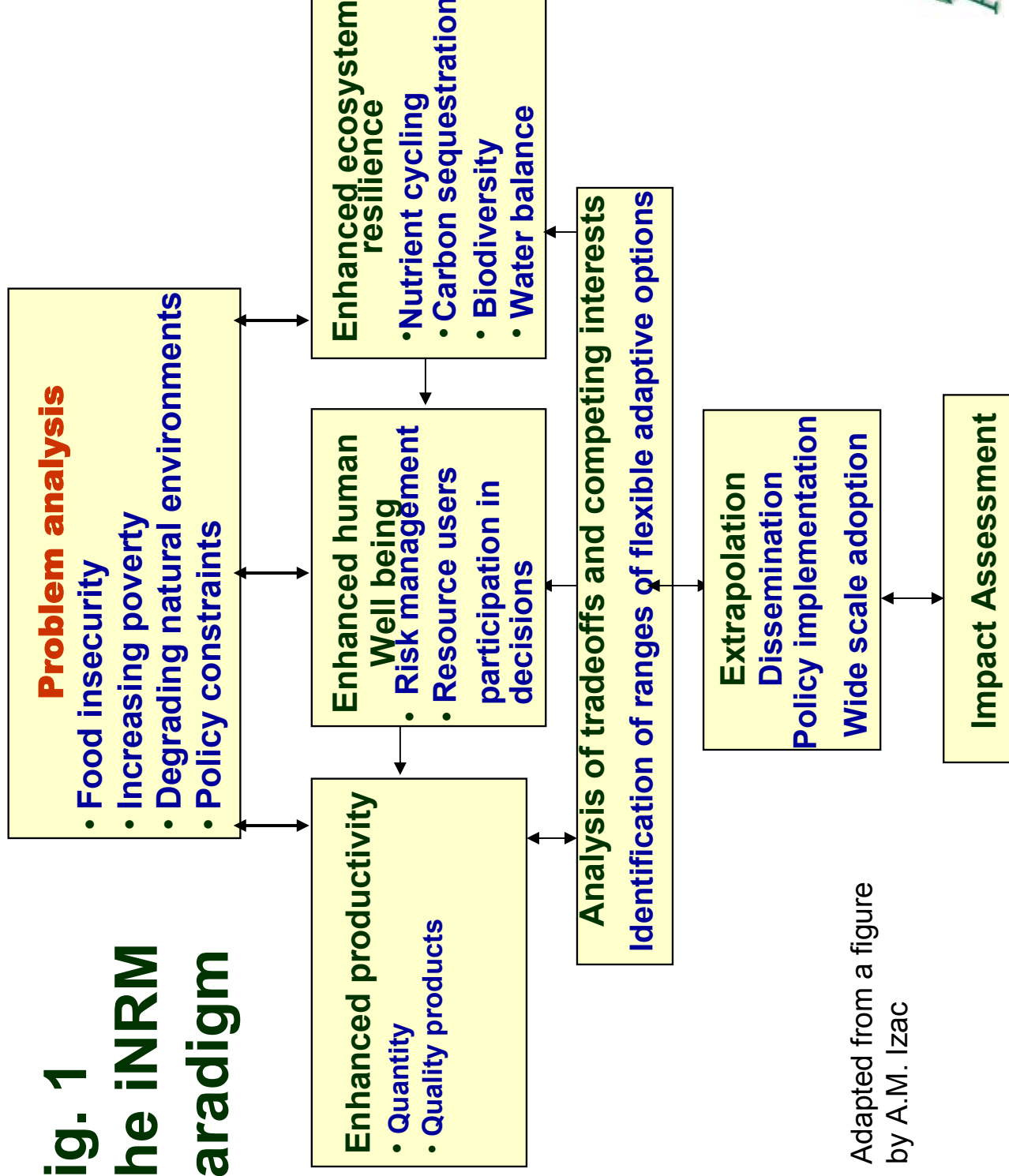
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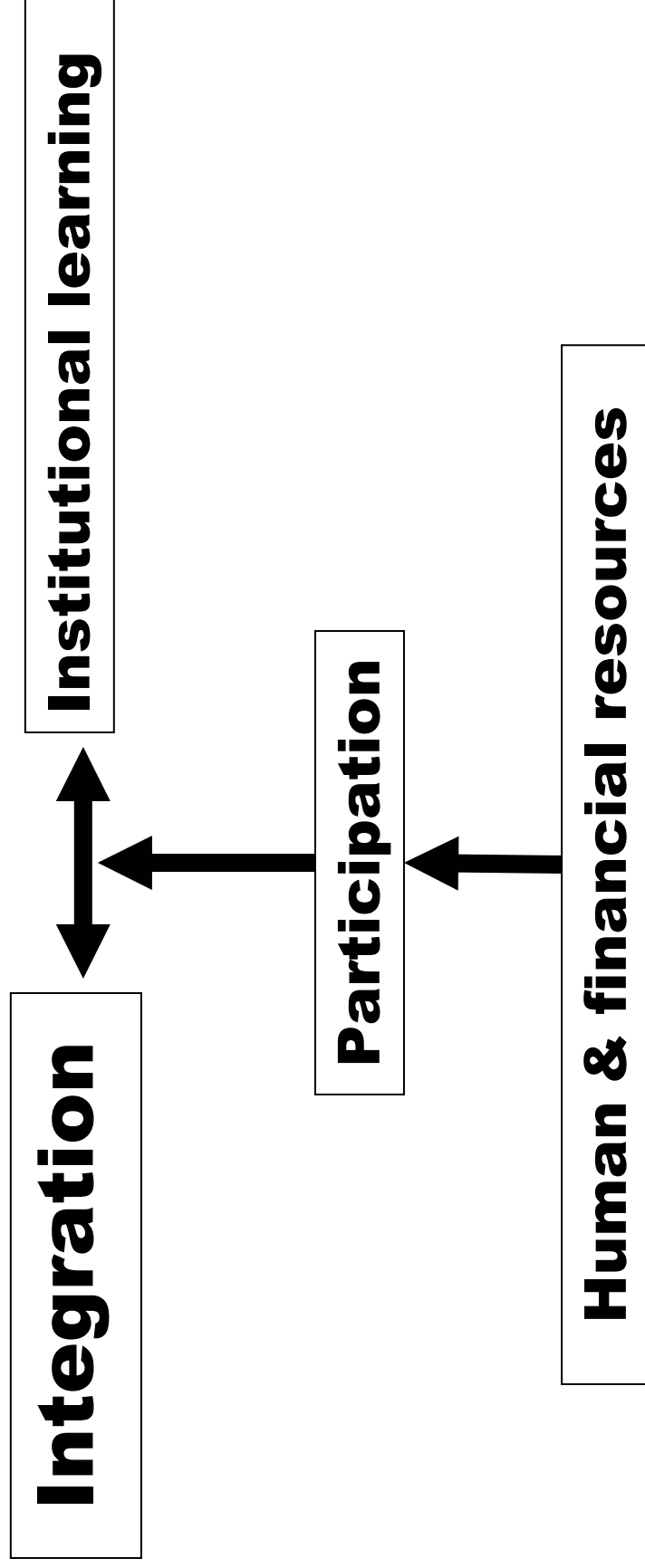
# Fig. 1 The iNRM paradigm



Adapted from a figure  
by A.M. Izac



# Figure 2. Analytical Framework



# Fig 3. ASB as a 'Boundary Organization' (Guston, 2001)

## Characteristics

- Forum for interaction among actors across social arenas
- Attention to managing boundary crossing activities

## Goals are achieved through boundary crossing activities:

- Communication
- Translation
- Mediation

