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# 1 A diagnostic framework for food system governance arrangements: the case of South Africa

## 2 1. Introduction

3 Food security in Africa is high on the policy agenda of governmental authorities, business actors, NGOs,  
4 and scientists throughout the world [1, 2]. Nowadays, food security is connected to an endless list of old  
5 and new challenges, such as the effects of environmental change including land degradation, loss of  
6 biodiversity, and changes in climate and weather patterns [3-5]; the expected growth of the world  
7 population and wealth together culminating in the growing demand for energy-dense foods, especially  
8 animal proteins [2, 4]; the variability and volatility of food prices [6]; the increasing speed of urbanisation  
9 and (young) people moving out of the agricultural sector [4] the unequal distribution of land rights among  
10 castes, classes, and gender [7]; the increasing vulnerability of production systems, especially among the  
11 poor who have no resource buffers [4]; the societal concerns regarding production technologies [8]; the  
12 juxtaposition of hunger and obesity [9]; the human rights to food [10]; the triple burden of malnutrition  
13 [11]; the pledge of food sovereignty [12], and the increasing importance of food for national security [7].

14 To enhance the necessary broader discussion on food security scholars have promoted the ‘food system  
15 concept’ [13-15]. It starts from the observation that much of the food security debate has traditionally  
16 centred on agricultural production and hunger alleviation, and that consequently interventions are  
17 narrowly linked to the work of specific NGOs and governmental institutions, usually those dealing with  
18 agriculture [15]. The food system concept aims to elucidate the interconnected relationships between  
19 various activities in the commodity chain (producing, distributing, trading, consuming of food); various  
20 issues linked to food security outcomes (access, availability, utilisation, nutrition); various interactions  
21 across scales (time, space, jurisdiction) and levels on them; and various socio-economic and  
22 environmental constraints and impacts [13-15]. More recently, policymakers and international  
23 organisations have been increasingly embracing this food system perspective [16]. As a consequence, the  
24 food system concept has evolved into a normative concept, instead of being analytic, helping decision  
25 makers to choose the right model for their specific institutional contexts [17].

26 To date, this food system concept is poorly reflected in institutional terms at local, national, and  
27 international level [4, 12, 18]. Approaching food from a system perspective reveals and in turn enhances  
28 important governance challenges and opportunities, because it requires more holistic forms of  
29 governance. By its nature, food governance institutions are fragmented and cut across the usual  
30 boundaries between sectors, administrative jurisdictions, public and private domains, temporal and spatial  
31 scales and diverse normative frameworks. The interdependencies of actors, activities, and problems  
32 within the food system challenge the efficacy of traditional modes and strategies of governance [19]. It is  
33 an attractive proposition for actors with a change agenda to emphasise that food cannot be dealt with  
34 appropriately by the current fragmented institutional architecture, and that therefore, “the governance  
35 system should be made more coherent and harmonized, better integrated and coordinated, and more  
36 inclusive” [1]. This may result in steering strategies such as top-down integration, new coordination  
37 structures, or mandatory mainstreaming. Hajer et al. [20] refer to this phenomenon as cockpit-ism: the  
38 illusion that top-down steering by governments and intergovernmental organisations alone can address

39 global problems. Others emphasise that improving food security requires a careful diagnosis of existing  
40 institutions and the tailoring of policy interventions to these varied institutional conditions [21]. Little is  
41 known, however, about more appropriate food system governance arrangements that reflect a realist and  
42 context specific perspective on governance [1].

43 Against this background, this article addresses the question as to what forms of governance are most  
44 appropriate to govern food systems in a more holistic way? This paper firstly presents a framework to  
45 diagnose these food governance arrangements. Therefore it synthesises various strands of literature into a  
46 multi theoretical model of five principles that are crucial for governance arrangement that embrace a food  
47 system approach. We refer to these arrangements as food system governance arrangements. Secondly,  
48 this framework is illustrated by an analysis of the strengths and weaknesses of three South African food  
49 governance arrangements, which are selected because they go beyond a single agricultural production  
50 frame, involve a broader spectrum of challenges and fit into a system perspective. Finally, the article  
51 discusses the results and proposes an agenda to further elaborate the framework and its practical  
52 usefulness.

## 53 **2. The five principles framework**

54

55 Although the number of articles on food governance is increasing (e.g. [1, 9, 10, 19, 22-27]), only a few  
56 have explicitly touched upon the topic of governance from a food system perspective. To fill this gap, we  
57 have developed a framework to analyse and diagnose food system governance arrangements. This  
58 framework departs from the outcomes of a systematic literature review of food system governance  
59 conducted by Hospes and Brons [18]. This review concludes, among others, that food system governance  
60 is an emerging field of study that requires further development. Therefore we have added governance  
61 insights from system-oriented approaches in other more or less related research fields, such as agricultural  
62 systems (e.g. [28, 29]); earth systems (e.g. [30, 31]), social ecological systems (e.g. [32-34]), and  
63 integrated water management systems (e.g. [35-38]). The resulting framework consists of five interrelated  
64 principles for appropriate food system governance arrangements: system-based problem framing;  
65 boundary-spanning structures; adaptability; inclusiveness and transformative capacity. The five principles  
66 framework is meant to diagnose food system governance and not the food system itself. It goes without  
67 saying that these principles are not exclusive for food system governance.

68

69 The first principle of *system-based problem framing* addresses the challenge of moving beyond one-  
70 dimensional problem frames [36]. A frame is a selection of “some aspects of a perceived reality” in such  
71 a way as “to promote a particular problem definition, causal interpretation, moral evaluation, and/or  
72 treatment recommendation” [39]. Because the food system involves many interacting subsystems [29], it  
73 cannot be reduced to narrow problem frames – of, for example, undernutrition, vulnerable agricultural  
74 production, land reform conflicts, poor infrastructure, or biodiversity loss – that do not address system  
75 intricacies [9]. Thus far the conceptualization of food systems by Ericksen [40] is the most  
76 comprehensive [18]. It comprises of interconnected activities and outcomes embedded in a dynamic  
77 environment driven by social-ecological change, and leading to multiple feed-forward and feed-back

78 signals. A system-based problem framing thus rejects “quests for a single framing of the problem” [10]  
79 and requires food governance arrangements that enhance reflexivity “in which people engage to discuss  
80 tensions regarding group objectives, recognize contradictions, and deal with differences in a respectful  
81 way” [42]. However, the construction of too broad and too vague problem frames, may paralyse  
82 policymakers. Therefore we follow Gray [41] who emphasizes the importance of a connection of  
83 different issue frames in a jointly meaningful story that can generate guidance and commitment.

84 The second principle of *boundary-spanning structures* addresses the challenge of fragmented siloed  
85 organisational structures [22, 43]. Food systems inherently involve many subsystems. Decisions that may  
86 impact food activities and outcomes occur across a range of spatial, temporal, and jurisdictional scales,  
87 and involve a wide range of public and private actors [18, 44, 45]. These decisions are all embedded in  
88 different subsystems, like health, environment, agriculture and economics-, which have particular  
89 interests, ways of addressing problems, time pressures and historically grown networks [29, 46]. The  
90 boundaries between these subsystems are not only physical and organisational, but also cognitive and  
91 social [35]. Whereas some degree of institutional fragmentation may increase the innovativeness of the  
92 system, too much (conflicting) fragmentation can result in bad performances [30, 33]. The challenge lies  
93 in connecting different policy subsystems through spanning boundaries, such as integrated programmes,  
94 coordination schemes, public–private partnerships, multi-stakeholder platforms, integrated participatory  
95 analysis, or mutual gains processes [29, 31, 37, 38, 47].

96 The third principle of *adaptability* addresses the challenge of uncertainties and volatility [42, 48] in non-  
97 linear systems. Though the need for adaptive governance is emphasized in many publications, in  
98 particular those that conceptualize food system as a social-ecological system, it has hardly been  
99 empirically elaborated and tested [18]. It is crucial for food system governance arrangements to remain  
100 “feasible and optimal under a dynamic environment of changing social, economic, political and climatic  
101 conditions” [43]. This requires flexibility because “all the social and environmental ‘actors’ are in motion  
102 all the time — plans and strategies that aren’t ... adaptive will not hit the mark” [42]. Much literature  
103 provides practical guidelines for modes of governance that can better adapt to uncertain pressures (e.g.  
104 [33, 34]) such as monitoring and back-up systems, room for self-governance and experiments, high levels  
105 of redundancy, flexible legislation that allows for tailor-made solutions, and decentralising decision-  
106 making authority [32, 33, 49]. Food governance scholars elaborate on these insights when they emphasise  
107 the need to: self-organise into more flexible networks [48]; enhance monitoring [23]; experiment by  
108 learning while doing [10]; encourage information sharing [50], and foster relational learning processes  
109 across scales and between communities [9].

110  
111 The fourth principle of *inclusiveness* addresses the questions about whom to include and exclude, and  
112 thus reflects the inherent political character of food systems. Hospes and Brons [18] identified the limited  
113 involvement of civil society as a main weakness of food system governance. Although inclusiveness is  
114 important in general, it is very much emphasized in system governance literature. Within the notion of  
115 earth system governance Biermann [51] and Biermann et al. [52], argue that institutional frameworks for  
116 sustainable development must address legitimacy, accountability, justice, fairness, and equity. It is in

117 particular important to “give voice to marginalized people” [18] and ensure social differentiation amongst  
118 participants [29]. On top of this, involving existing local networks and communities could also contribute  
119 to a more holistic and system-based approach, since civil society actors do not think in silos and easily  
120 link “issues related to food, for example, food access, obesity, food supply, and nutrition” [19, 42, 50].

121 Because the food system perspective displays features of a paradigm shift, the fifth principle of  
122 *transformative capacity* addresses the challenge of transformative change. This principle is the least  
123 specific for food system governance. It fits into the suggestion of many authors who discuss the  
124 governance of complex problems, and point to the need for moving toward a totally different governance  
125 regime [18]. Transformative change includes “shifts in perception and meaning, changes in underlying  
126 norms and values, reconfiguration of social networks and patterns of interaction, changes in power  
127 structures, and the introduction of new institutional arrangements and regulatory frameworks” [53]. In  
128 general, governance institutions are highly resistant to transformative change because of all kinds of path  
129 dependencies, defined as the mechanisms whereby current decisions are determined or limited by  
130 decisions in the past, reflecting vested interests and historically grown power positions [54]. Documented  
131 examples of path dependencies in the food system are: the “historical tendency of domestic agricultural  
132 policy biases to favour the cultivation of import substitution high water-demanding food crops” [43];  
133 “strategic interactions between private and public marketing actors [that] lead in some cases to heightened  
134 market instability and food crises” [25] or “import taxes on steel, but not on imported agricultural  
135 machinery, that disadvantage manufacturers in developing locally adapted agricultural equipment” [29].  
136 It is important to note that we refer not only to formal but also to informal institutions, for example  
137 patron–client relationships, which often play a larger role in the developing world [27]. To overcome path  
138 dependencies, governance arrangements are required that enhance transformative capacity, understood as  
139 “the ability to bring about substantial sustainable system changes” [55]. These capacities may include  
140 advanced forms of leadership, resources, and skills; target agenda setting, policy planning,  
141 implementation and enforcement, and long-term embodiment [55]; and require the identification of entry-  
142 points for innovation [29].

143  
144 Although these five principles are not the only way to synthesize insights from literature, taken together  
145 they allow for a much more comprehensive diagnosis of food system governance arrangements than an  
146 analysis based on just one theoretical concept or model. An additional reason for developing five  
147 principles is that each principle contains its own trade-offs. Too much focus on system-based problem  
148 framing can lead to paralysis. Too many boundary spanning arrangements can blur responsibilities and  
149 modes of democratic accountability. Focussing on adaptiveness alone may undermine effectiveness and  
150 efficiency. A single focus on inclusiveness could ignore the role of other actors who have important  
151 resources at their disposal. Transformative capacity is crucial, but may neglect the importance of stability  
152 and predictability and might also lead to an even more undesirable governance state.

153

154 **3. Methods**

155 We chose South Africa as study area, because of its multiple food problems. Furthermore, the  
 156 involvement of South African scholars provided us with access to relevant documents and actors. For our  
 157 illustrative empirical study, we aimed to analyse South African governance arrangements that embrace a  
 158 food system perspective. However, most existing governance arrangements in South Africa do not qualify  
 159 as food system arrangements, because they aim to alleviate food insecurity with a focus on a single issue  
 160 or are narrowly linked to the work of one specific department. As examples, these include agricultural  
 161 credit and production programmes of the Department of Agriculture, Forestry, and Fisheries (DAFF), the  
 162 Primary School Nutrition Programme of the Department of Basic Education, and the ‘food for all’  
 163 programme of the Department of Social Development. We have selected three long-term public  
 164 governance arrangements that – at least on paper – aim for a more holistic system-based approach. The  
 165 first is the *Integrated Food Security Strategy (IFSS)* because it aims “to streamline, harmonize and  
 166 integrate diverse food security sub-programmes ... and a comprehensive and multi-sectoral approach of  
 167 all spheres of government, and the active participation of the private sector and civil society” [56]. The  
 168 second is the South Africa *Integrated Nutrition Programme (INP)* because it introduced “a  
 169 comprehensive approach to address the underlying causes of malnutrition through direct and indirect  
 170 nutrition interventions” [57]. The third is the *LandCare programme*, because it aims to “embed integrated  
 171 sustainable natural resource management into a broader holistic policy framework of food security,  
 172 poverty alleviation and capacity building” [58]. The long-term characteristic of the programmes provided  
 173 us the opportunity to analyse all phases in the policy cycle, from agenda setting up to implementation and  
 174 evaluation.

175 Table 1: Framework: five principles for food system governance arrangements

<b>Principles</b>	<b>Challenges</b>	<b>Indicators</b>
System-based problem framing	To deal with interlinked issues, drivers, and feedback loops	<ul style="list-style-type: none"> <li>- beyond one dimensional problem definition</li> <li>- feed-back mechanisms</li> <li>- integrative narrative</li> <li>- room for reflexivity</li> </ul>
Boundary-spanning structures	To organise connectivity across boundaries of sub-systems involved	<ul style="list-style-type: none"> <li>- interactions across levels and sectors</li> <li>- spanning siloed governance structures</li> <li>- public-private partnerships</li> </ul>
Adaptability	To respond flexibly to inherent uncertainties and volatility in non-linear systems	<ul style="list-style-type: none"> <li>- monitoring systems</li> <li>- decentralisation and self-organisation</li> <li>- flexibility</li> <li>- learning while doing</li> </ul>
Inclusiveness	To involve actors who are affected by the problem and the proposed policies	<ul style="list-style-type: none"> <li>- involvement of marginalized voices</li> <li>- social differentiation amongst participants</li> </ul>

		<ul style="list-style-type: none"> <li>- involvement of local communities and networks</li> </ul>
Transformative capacity	To overcome path dependencies and create adequate conditions to foster structural change	<ul style="list-style-type: none"> <li>- addressing path dependencies and lock-ins</li> <li>- leadership</li> <li>- resources</li> <li>- political will</li> </ul>

176

177 The five principles framework is used to diagnose these three different food system governance  
178 arrangements. For this purpose the principles are translated in sets of indicators (see table 1). The analysis  
179 is based on various data collecting methods: published papers, previous research of the authors, policy  
180 documents and websites. To contextualise, actualise, and deepen the insights, we organised two  
181 workshops with policymakers (DAFF mainly), NGOs (e.g. Oxfam), private companies (e.g. AgriSA,  
182 Maize and wheat steering committee) and research organizations in South Africa (e.g. FANRPAN,  
183 Medical Research Council) (2 October 2014/24 people; 6 February 2015/ 26 people). We discussed  
184 various topics during these workshops, such as the food system perspective (does it make sense?), the  
185 relevant network, future scenario's, and obstacles towards more integrated food governance  
186 arrangements. Finally, a research team of scientists from South Africa and abroad interpreted the data,  
187 using the indicators from the framework.

#### 188 **4. Results**

##### 189 *General analysis of the South African food system*

190 This section very briefly describes the state of food security in South Africa in terms of the food system  
191 perspective, including the various processes in the commodity chain (producing, distributing, trading,  
192 consuming of food); and its food security and environmental outcomes (see introduction).

193 *The food system.* The South African food system can be described as dichotomous. On the one side, there  
194 is an established formal, commercial sector that is connected with international agribusiness and  
195 international finance that enables access to different, convenient foods at a cheaper price. On the other  
196 side, there are a larger number of poorer, small-scale black farmers and informal traders that operate at  
197 the margins of the formal system. Despite various political promises, the old agrarian and land systems  
198 remain in place. As of 2012, 87% of arable land in the country was still owned by white, commercial  
199 farmers who produce almost all of the country's marketed output [59]. There are high barriers to entry for  
200 small farmers, manufacturers, and retail outlets to be a part of the increasingly competitive and  
201 commercial formal food system in South Africa [60]. Deregulation, that was largely welcomed by South  
202 African agribusiness, began in the 1980s in order to comply with the WTO regulations and to achieve  
203 competitiveness required to survive in the new competitive environment [61]. Because of the resulting  
204 openness of South Africa's market, international food price shocks are almost fully transmitted down to  
205 local wholesale and retail prices, making poor households extremely vulnerable to food price increases  
206 [62]. The 2002/03 and 2007/08 food price crises did not result in structural policy changes, but have

207 reinforced the country's reliance on short-term policy interventions that deal directly with relieving the  
208 burden of food price inflation for poor households, such as welfare payments, school feeding schemes,  
209 and food packages [62]. Nowadays, the issue of land reform is high on the political agenda. It fits into a  
210 larger debate around the need for agrarian reform in the country that will include marginalised farmers  
211 and communities in the country's food system. The lack of progress has become an issue of great concern  
212 for many local communities and civil society movements, but the uncertainties of land reform policies  
213 also disquiet the private sector.

214 *Food security outcomes.* Although South Africa is food secure at national level, meaning that in case of  
215 equitable distribution there is enough food for all, at household level there is worrying evidence of a high  
216 prevalence of hunger and micronutrient deficiencies in both urban and rural areas that is related to socio-  
217 economic factors [63]. The rights of all South Africans to adequate food, grounded in the South African  
218 Constitution, have not been met in reality [24]. South Africa is also facing the so-called double burden of  
219 malnutrition: stunting, wasting, and undernutrition in young children is occurring alongside increasing  
220 levels of obesity and overweight in older children and adults [63]. The rapid urbanisation underway in  
221 South Africa is having serious repercussions on the food system's ability to provide food to urban  
222 dwellers [64]. More than 60% of South Africa's population now live in urban areas and rely on  
223 purchasing their food. Supermarkets have expanded into lower income areas by out-competing local  
224 wholesalers and small retailers on cost and quality in most of their product offerings [65]. These  
225 developments undermine the ability of households to invest in household food production, reinforce de-  
226 agrarianisation trends, and reinforce consumers' choice of affordable, but nutritionally poor, foods in low  
227 income areas [66]. The government's response to the 2008 food price crisis showed a rural bias,  
228 emphasising that poor people should grow their own food, neglecting urban dwellers and foreign  
229 migrants without access to land [67].

230 *Environmental outcomes.* The South African food system is very vulnerable to environmental change and  
231 in particular to changing water availability as a result of climate change. Natural water resources are  
232 unevenly distributed across the country, with more than 60% of the surface flows arising from only 20%  
233 of the land area [68]. Since the agricultural sector currently consumes 60% of the total water resource in  
234 the country, any increase in irrigation for growing food would thus impact the water and energy systems  
235 [69]. Other projected impacts include an increase in extreme events and high temperatures exceeding the  
236 natural tolerance levels of crops. In response to climate variability, many farmers have started deploying  
237 various adaptation methods, which can be seen at multiple levels and mostly comprise adjustments in  
238 farming operations [68]. Loss of natural habitats is regarded as a key driver of the loss of ecological  
239 integrity worldwide. The intensification of agricultural production is widely known to reduce biodiversity  
240 [70], and the range of ecosystem services that are provided by those species (e.g. [71]). Within the South  
241 African context, rich biodiversity has been linked to food security mainly through direct consumption and  
242 via income generated from tourism or commercialisation [72]. Although much further work is needed to  
243 accurately quantify the impact of the loss of wildlife on food security (e.g. the extent of reductions in  
244 pollination services, pest control, and so forth, due to wildlife loss), it is clear that the relationship is a  
245 negative one [73].



246 *Analysis of the Integrated Food Security Strategy (IFSS)*

247 In 2002, after years of drafting, the South African Cabinet issued the Integrated Food Security Strategy  
248 (IFSS). It aimed “to attain universal physical, social and economic access to sufficient, safe and nutritious  
249 food by all South Africans at all times to meet their dietary and food preferences for an active and healthy  
250 life” [56]. This plan was motivated by: the rapid rise in food prices; reports pointing to the increasing  
251 number of people vulnerable to hunger; the global attention on food security; and the “unsatisfactory  
252 situation that was occasioned by the implementation of many food security programmes by different  
253 government departments in all spheres” [24]. It consisted of a number of ambitious objectives,  
254 accompanied by measures and arrangements to meet them, such as: an increase in household food  
255 production, job creation opportunities, nutrition security, food safety and trading; and the development of  
256 food emergency management systems, capacity building, and stakeholder dialogues [56].

257 *System-based problem framing.* On paper, the guiding problem definition certainly moved beyond a one-  
258 dimensional problem frame. The IFSS adopted a broadly developmental rather than strictly agricultural  
259 approach to food security [74]. It presented a broad spectrum of issues, varying from food availability and  
260 access to empowerment and mitigating the impacts of natural disasters. It also addressed more politically  
261 sensitive issues such as, for example, the lack of institutional capacity in poor areas. Various multi-  
262 sectoral fora were installed to encourage reflexive debates. However, an integrative story that linked these  
263 issues and initiatives was lacking. Whereas the official document showed a certain level of system-based  
264 problem framing and reflexivity, the implementation phase reverted to a one-dimensional agricultural  
265 production frame with a single focus on national food security. DAFF, the national department appointed  
266 to coordinate and facilitate the integrated strategy, was biased by an agricultural production frame and  
267 thus failed to start from the initial comprehensive frame [24].

268 *Boundary-spanning structures.* The IFSS deliberately aimed to streamline, harmonise, and integrate the  
269 diverse food security programmes across government departments [75]. It comprised ambitious objectives  
270 to improve coordination among governmental levels, enhance relations between the several national  
271 departments, and foster cooperation among public and private organisations. Various multi-sectoral  
272 platforms were planned to stimulate creative interventions, such as the Integrated Food Security and  
273 Nutrition Task team and the National Food Security Forum. However, inadequate structures hindered the  
274 effectivity of these boundary-spanning structures [24]. The IFSS did not have its own programme with  
275 actions, but had to bring together various programmes of different ministries [74]. This coordination was  
276 tasked to a directorate within the agricultural department that had neither much administrative capacity  
277 nor authority to coordinate a complex policy. Its emphasis on agricultural production did not fit into the  
278 problem frames of other departments and thus discouraged these departments from actively participating.  
279 Permissiveness and lack of authority further reduced the commitment to join. The blurring of budgets,  
280 that were allocated by sectors and labelled for specific activities, was not allowed, which prevented the  
281 emergence of joint projects and programmes. Despite the good intentions, the silo approach dominated,  
282 and linkages with other sectors remained vague [24].

283 *Adaptability.* The IFSS was motivated by the rapid change in food prices. It shows some understanding of  
284 the volatility of the issues and the need to establish arrangements that could facilitate adaptability. It  
285 aimed to coordinate activities for monitoring vulnerability to hunger and malnutrition and for predicting  
286 food shortages. It also presented some activities to anticipate food emergencies. Further, the strategy  
287 endorsed the strengthening of a decentralised planning system by highlighting the need for additional  
288 resources and technical support, which, if realised, would increase adaptability. However, in practice less  
289 was realised. Despite significant investments, the IFSS has not established an appropriate information  
290 system. Various institutional constraints, such as for example the formalised disjuncture between national  
291 and provincial government [76], hindered opportunities to flexibly align activities across levels and  
292 sectors, as is required for rapid and flexible responses to emergencies [48].

293 *Inclusiveness.* The strategy recognised the importance of equity in its remit, but it did not meet the  
294 expectations in practice. The promised multi stakeholder platforms were not installed and stakeholder  
295 dialogues with civil society actors and communities were minimal [24]. Because the leading department  
296 was not able to move from its focus on a prosperous agricultural by the predominately white commercial  
297 sector, there was less involvement from the black majority, who suffered most from the food insecurity  
298 problems.

299 *Transformative capacity.* The IFSS belonged to the post-apartheid policies, all aimed to address the  
300 adverse impact of apartheid and move the country forward as a unity [74]. It included an innovative blend  
301 of mechanisms to stimulate and support programmes that would engage creatively with food insecurity  
302 [74]. Whilst the IFSS was good on paper and came at an opportune time in the South African political  
303 context, it has not achieved many of its goals [74]. Existing institutional structures, reflecting existing  
304 power constellations, hindered the implementation of the proposed food system governance arrangement.  
305 There were no dedicated funds for government to spend on food security that could have changed the  
306 path dependency whereby the current siloed budget system encourages continual non-collaboration and  
307 implementation of relevant programmes in a disjointed manner [24]. Leadership also failed to open up  
308 lock-ins in the traditional and closed agricultural policy community.

### 309 ***Analysis of the South Africa Integrated Nutrition Programme (INP)***

310 After the first democratic elections in 1994, several nutrition intervention programmes were implemented  
311 under a comprehensive national strategy to combat malnutrition. The major response to malnutrition in  
312 the country has been the Integrated Nutrition Programme (INP) [77]. The programme has been based on  
313 internationally accepted best practice, has a comprehensive set of interventions, and emphasises the social  
314 determinants of nutritional health. The INP, which is frequently updated, has three main components:  
315 health facility-based nutrition programmes and strategies; community-based nutrition programmes and  
316 strategies; and nutrition and HIV and AIDS support programmes and strategies [78, 79]. The INP is  
317 intended to replace previously fragmented nutrition programmes with a more integrated approach. It aims  
318 to address broader political and economic forces that impact the health and nutritional status of the  
319 population. In so doing its intention is to work cooperatively with other sectors and the communities  
320 involved; and to raise awareness of local and global issues affecting food production and supply. A

321 review of the INP as well as a Landscape Analysis resulted in the repositioning of nutrition and nutrition-  
322 related issues and actions [79].

323 *System-based problem definition.* The INP adopted the United Nations Children Fund's (UNICEF's)  
324 conceptual framework on undernutrition, which outlines the multiple causes of undernutrition operating  
325 at various levels in society. This framework provides a broad system-based analysis of malnutrition in  
326 general, but requires contextual analysis to make it locally applicable. It is not clear how the framework  
327 was translated into a comprehensive meaningful story for the specific situation in South Africa.  
328 Furthermore, the problem frame is based in a primary healthcare within the INP, with less attention on  
329 issues of agricultural production or environmental outcomes [78]. Despite its broad problem frame, the  
330 main pillar ( in terms of budget) of the programme became the National School Nutrition Programme  
331 [74].

332 *Boundary-spanning structures.* The INP is situated within the Nutrition Directorate of the Department of  
333 Health. The plan aimed to organise several linkages with other departments such as Education (i.e. school  
334 feeding programme), Finance (i.e. taxation and subsidies), Agriculture (i.e. food gardens), Environmental  
335 Affairs (i.e. fortified foods), and Social Development (i.e. child grants). However, the actual integration  
336 between these departments has been suboptimal due to weak coordination structures that impede  
337 cooperation across scales [78]. A multi-sectoral nutrition working group, which was intended to include  
338 various departments and partners including actors in industry, academia, and development partners, was  
339 poorly activated. This working group was necessary to play a key role in advocating for greater attention  
340 to nutrition focusing on priority interventions, and to promote better coordination among the different  
341 actors [80].

342 *Adaptability.* The Nutrition Directorate was expected to develop a comprehensive information plan that  
343 would underpin an effective monitoring and evaluation system to guide implementation. This would  
344 ensure the adaptation of interventions to the local situation. Despite these objectives, a systematic, co-  
345 ordinated effort and proper monitoring system have not emerged. The collection and utilisation of  
346 available information at provincial and district level should be a priority to ensure appropriate targeting  
347 and resource allocation towards the most needy [78].

348 *Inclusiveness.* Officially, the targeted population consisted of nutritionally vulnerable communities and  
349 groups [74]. The idea was to implement the INP at the level of population, community sites, households,  
350 health facilities, and schools. However, these ambitions got stranded. The Landscape Analysis, designed  
351 to assess the country's readiness to accelerate action in nutrition, among others revealed that nutrition  
352 actors held different views on the major causes and priorities of nutritional problems facing South Africa  
353 [79]. The dominant perception was that nutrition action consisted of the provision of food parcels and  
354 food gardens revealing a very narrow response to malnutrition [79]. This revealed a lack of multi-actor  
355 involvement and response across society, which was heralded as a key tenant of the INP. Further  
356 limitations have occurred at community level, with an inability to facilitate a comprehensive approach at  
357 this level [78].

358 *Transformative capacity.* From inception, the INP advocated for transformative policy changes in relation  
359 to these issues. The idea was to develop strategic capacity at national and provincial level to identify and  
360 open up path dependencies and lock-ins. This strategic capacity was intended to foster political will,  
361 negotiate agreements, respond to challenges and opportunities, build relationships between nutrition  
362 actors, and undertake strategic communication with varied audiences. However, inadequate human  
363 resources have been identified as the most significant contributors to the lack of progress [74]. Also,  
364 advice to modify the ambitious objectives defined in the INP based on analysis of the context and  
365 available resources has not been followed [78].

### 366 *Analysis of the LandCare programme*

367 In 1997, the Government of South Africa through DAFF introduced the LandCare programme to reduce  
368 degradation of natural agricultural resources by recognising and addressing its primary causes, in  
369 particular in the former Homelands, where black South Africans were relegated under *Apartheid* spatial  
370 planning [56]. The overall objective of LandCare has been to optimise productivity and the sustainable  
371 use of natural resources, leading to greater productivity, food security, job creation, and a better quality of  
372 life for all [58]. The concept of ‘care for the land and the land will care for you’ provides the underlying  
373 philosophy [81]. The programme is frequently updated. Nowadays, the programme is organised around  
374 four thematic areas: soil care, water care, veld care, and junior LandCare [58].

375 *System-based problem definition.* The programme was designed on a system-based analysis of the  
376 problem by recognising and addressing the vicious circle whereby degradation of natural resources has a  
377 direct and significant impact on those living in rural areas, who respond to increasing pressure with  
378 unsustainable agricultural practices, which in turn cause further degradation of natural resources [81].  
379 Therefore, the programme deliberately aimed to link natural resource issues with agricultural production,  
380 food security, capacity building, and poverty alleviation. However, through the years, the focus has  
381 narrowed to enhancing sustainable farming systems, in particular conservation agriculture [58]. It is  
382 telling that a search of peer-reviewed literature yielded no studies that had assessed the natural resource  
383 management component of the LandCare Programme in South Africa.

384 *Boundary-spanning structures.* LandCare aims to span boundaries by building public–private  
385 partnerships. For example, DAFF, a Provincial Department of Agriculture, and private sector  
386 stakeholders can form a partnership with a local community in order to collectively prepare specific  
387 project plans and proposals and implement those that are selected and financially supported [81]. In doing  
388 so, it blends together national policies and bottom-up initiatives. Furthermore, in 2006, South Africa  
389 initiated the African LandCare network to develop synergies across countries [58]. However, at all  
390 governmental levels (regional, national, provincial), agricultural departments dominate the programme  
391 with very few linkages with other departments. This dominance is reflected in the funding structure.  
392 Previously, the LandCare programme was funded from the South African poverty relief fund, and since  
393 2005 it has been funded from the budget allocated to DAFF [81].

394 *Adaptability.* One of the core tenets of the LandCare programme is that it contributes to reducing  
395 vulnerability to erosion and climate change. However, the ability of the programme to flexibly react to

396 new emergencies is very limited, because of the complex administrative procedures of writing, assessing,  
397 funding, implementing, and evaluating LandCare projects [81].

398 *Inclusiveness.* Officially, equity is a core aspect of the LandCare programme. As a grass-roots  
399 programme, theoretically supported by both the public and private sector, LandCare stimulates  
400 partnerships at local level required to address locally relevant issues. However, land in South Africa is a  
401 very sensitive topic. Whilst the programme aims to address the inter-relatedness of ecosystem degradation  
402 with poverty, it struggles to tackle the broader structural and historical inequities embedded within the  
403 South African food system [59]. This limits the inclusivity of the program. .

404 *Transformative capacity.* Although promising on paper, the strategy of aligning natural resource  
405 management and poverty alleviation can only yield meaningful results if inequalities based on the  
406 historical, political, and social path dependencies are addressed [82]. If not and despite some short-term  
407 relief, long-term sustainability will not be achieved. Furthermore, evidence of policy effectiveness (or  
408 lack thereof) is, of course, important for future planning. Given the small size of the programme over the  
409 past 20 years, Greenberg [83] qualifies it as “a drop in the ocean”, that serves more as a poverty-  
410 alleviation exercise than as a real attempt to alter land management systems and methods in an  
411 ecologically sustainable way. Furthermore, he concludes that leadership is lacking, because the LandCare  
412 programme is not a serious component of DAFF’s work [83]. This is largely a result of an inadequate  
413 budget that arguably reveals a lack of political will to drive the processes required to address long-  
414 standing issues.

## 415 **5. Discussion**

### 416 *Diagnosing the three arrangements*

417 On paper the three programmes showed many strengths and some weaknesses with respect to the five  
418 principles. They were all motivated by a perceived lack of synergy between the various existing  
419 individual sector policy initiatives addressing food security. To overcome these shortcomings, all three  
420 programmes were based on a system-based problem framing, a high level of boundary-spanning  
421 ambitions and plans for advanced monitoring systems. They all linked food security with other issues that  
422 are important for the food system, but they also had their blind spots. Biodiversity issues, for example,  
423 were only mentioned in the LandCare programme, health issues only in the INP, and food prices and  
424 market issues only in the IFSS. They also all lacked a more integrative narrative that linked the various  
425 issues; this could have contributed to internalising the system-based problem framing and to making it  
426 more sustainable for the longer term. Whereas LandCare included a range of food system actors, IFSS  
427 and INP were -even on paper- predominantly government focused with less inclusion of private and civil  
428 society actors. A minor weakness of all three programmes was the limited attention to adaptability in  
429 terms of flexible rules and self-organisation.

430 Despite the attempts to develop more integrated food strategies, the results have been disappointing [80].  
431 Although the programmes were promising on paper, the implementation has been sub-optimal. This was  
432 not caused by inappropriate policies or lack of knowledge about relevant solutions. Rather, the tensions

433 between the ambitious objectives of the policy programmes and the administrative constraints of  
434 implementing them are key to explaining the ultimate difficulties. Weak coordination structures, budget  
435 and funding rules that impede collaboration, inadequate human resources, and inflexible administrative  
436 procedures, were identified as the most significant contributors to the lack of progress. On a deeper level  
437 we revealed tensions between the promising policy documents and the stubborn implementation  
438 practices, or between ambitious objectives and institutional constraints. If DAFF is charged with  
439 coordinating the IFSS, reversion to a single agricultural problem frame is perhaps not surprising. If a  
440 relatively weak directorate in the Ministry of Health is mandated to implement the INP, it cannot be  
441 expected to foster strategic capacity and political will. And if sensitive land reform issues are not being  
442 addressed in a LandCare programme, the depoliticised programme will never become more than ‘a drop  
443 in the ocean’. Most importantly, if programmes provide only limited room for reflexive debates amongst  
444 a variety of stakeholders, even the most innovative plans will become paper tigers.

445

#### 446 *Reflection on the five principles framework*

447

448 The five principles can mutually reinforce, balance or weaken one another. For example the lack of  
449 boundary spanning across departmental silos during the implementation resulted in a reversion to a single  
450 problem definition, which in turn further reinforced the exclusion of other state and non-state actors. The  
451 limited inclusion, in particular of those most affected by food insecurity, indirectly caused the reverse to a  
452 technical depoliticised problem frame, that could be seen as an important reason for the lack of political  
453 attention and the limited allocation of resources. Adaptability cannot be realised at a national level only,  
454 and thus became a weak element due the lack of boundary spanning across jurisdictional scales and the  
455 minimal involvement of local governments and communities. These findings confirm our theoretical  
456 assumption that the five principles together allow for a much more comprehensive diagnosis than an  
457 analysis based on just one principle.

458

459 We also revealed that the principle of transformative capacity underlies the other four principles.  
460 Transformative leadership in the agenda setting phase resulted in ambitious plans with attention for all  
461 principles. However, leadership failed to facilitate transformative change of the constraining institutions  
462 in the implementation and enforcement phase. A major reason why South Africa falls short of  
463 implementing food insecurity policies in a system-changing manner is that food insecurity is not simply a  
464 technical issue that can be addressed by programmes run by existing departments. Overcoming food  
465 insecurity requires a systematic approach and political will to challenge vested interests, dominant  
466 ideologies, bureaucratic traditions, political cultures, and distribution problems in the food system.  
467 However, a food system governance approach is impossible without institutional reforms within  
468 governmental departments, which in turn requires transformative capacity [85]. This aligns with the  
469 literature stating that change in governance institutions is required to enable new forms of governance  
470 that more appropriately deal with the wicked problem of food security [86].

471

472 Applying a system perspective inherently touches upon the question of system boundaries. In the  
473 introduction we departed from an ideal definition of a food system that includes all activities in the  
474 commodity chain (producing, distributing, trading, consuming of food); all interactions across scales  
475 (time, space, jurisdiction); all food security outcomes (access, availability, utilisation, nutrition) and all  
476 environmental outcomes. This definition results in a very broad and ambiguous system boundary. During  
477 the application of the framework we followed a pragmatic approach. While it is good to have a very  
478 broad problem definition that covers many elements, you cannot expect that all the related subsystems  
479 and actors are equally involved. Therefore we already qualified a principle as strong if more  
480 subsystems/actors were involved than usual and if they were not explicitly (for political reasons for  
481 example) excluded. This pragmatic boundary construction requires more conceptual elaboration.

482

#### 483 *Practical use and relevance of the framework*

484

485 Our five principles framework has helped to diagnose the strengths and weaknesses of South African  
486 food system governance arrangements, both on paper and in practice. An important but not very  
487 surprising lesson, is that the framework can only be applied in collaboration with scholars who have in-  
488 depth knowledge of the governance practices of a country and can distinguish between the formal and  
489 hidden transcripts [84]. If not, our analyses would have shown a much more positive picture. During the  
490 workshops we did not systematically check our framework but we experimented with some of its  
491 elements and got a first idea of its meaning for practitioners and policy makers. Based on our introduction  
492 of food system governance the workshop members identified many interesting hindrances. The civil  
493 servants, for example, mentioned that despite their ambitions they continue to work in their silos; that  
494 local, provincial and national agencies are developing programmes that are running concurrently; and that  
495 they lack skilled capacity and human resources to implement more holistic plans. Private actors, for  
496 example, mentioned their lack of understanding about governance; the unclear status of governmental  
497 interventions; and the difficulty of joint actions of business actors, farmers and civil servants.  
498 Interestingly, workshop members also identified opportunities for innovation and seeds for transformative  
499 change. Using elements of our framework thus helped to raise awareness of governance and its  
500 difficulties, go beyond blaming and disqualifications, and co-produce recommendations.

501

502 Finally, we want to show the policy relevance of our framework to diagnose new food governance  
503 developments. In 2014, the South African Cabinet endorsed the new Integrated Food and Nutrition  
504 Security Initiative [87]. This new policy replaced the IFSS and is based on a broad problem definition that  
505 links food security to nutrition security. It identifies four specific dimensions (adopted from [88]):  
506 adequate availability of food; accessibility; utilisation, quality, nutrition, and food safety; and stability of  
507 the food supply. Similar to the IFSS, this initiative recommends inter-sectorial coordination and a real  
508 integration of existing policies. In contrast to the IFSS, however, the policy suggests that DAFF is no  
509 longer the coordinating department and that the work is guided, motivated and led by the Presidency, with  
510 each element championed by a specific ministry, supported by various other ministries and departments.  
511 Based on our analysis we qualify this as a strength. Applying our five principles framework already helps

512 to diagnose some serious weaknesses. These include poor inter sectoral consultation (partial boundary  
513 structures), a lack of stakeholder engagement (limited inclusiveness), direct control of government with  
514 little space for private actors and local governments (limited adaptability), and unclear legal status  
515 (limited authority to enforce transformative capacity) [80]. Again, this new programme runs the risk to  
516 get stranded in a vicious cycle that is characteristic for many South Africa reform plans: “increased  
517 regulation is followed by more noncompliance, leaving the citizens without effective governance  
518 structures and deepening the rift between the aspirations of the developmental democratic state and its  
519 actual achievements on the ground” [76].

## 520 6. Conclusions

521  
522 This article aimed to diagnose what type of governance arrangements are good for sustainable food  
523 security in Africa in view of a food system perspective. By their nature, food governance systems are  
524 fragmented and most existing governance arrangements that address food-related issues are poorly  
525 equipped to deal with food in a holistic and inclusive way. This article presented a framework of five  
526 related principles underlying appropriate food system governance arrangements, and used it to diagnose  
527 three food governance arrangements in South Africa. By applying the framework we could identify some  
528 explanations for the disappointing outcomes: a reversion to a technical one-dimensional problem framing  
529 during implementation and inherent depoliticising; the dominance of single departments; the limited  
530 attention on flexible responses, which is crucial given the increased vulnerability due to climate change  
531 and volatile world markets; and a lack of stakeholder involvement. A more general conclusion is that the  
532 tensions between the ambitious objectives of the arrangements and the institutional constraints of  
533 implementing them can persist because of inadequate resources to facilitate transformative change.

534  
535 A limitation of this study is that we have analysed only governmental programmes, and further research  
536 on private governance arrangements could add to our insights. In particular, it would be important to  
537 analyse whether Glasbergen and Schouten’s [55] finding – that only a combination between public and  
538 private governance arrangements will be able to realise paradigmatic change in environmental systems –  
539 also applies to the governance of food systems in South Africa. Second, we suggest further elaborating  
540 the five principles framework in other contexts, such as local communities, regions, and international  
541 arenas, and parts of the world with different governance traditions. Third, we suggest using the  
542 framework for large N studies to develop a database on food system governance arrangements and  
543 generate quantitative results. Fourth, we suggest to analyse if these principles could also be used to design  
544 or improve food system governance arrangements. Finally, we suggest translating the framework into an  
545 attractive tool that can be used in reflective workshops with policymakers and other stakeholders to learn  
546 about their food governance practices.

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552 **Conflict of Interest statement**

553 The authors declared that they have no conflict of interest.

554

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556

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