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2016

https://doi.org/10.25595/3863

Veröffentlichungsversion / published version
Zeitschriftenartikel / journal article

Empfohlene Zitierung / Suggested Citation:

Padmanabhan, Martina: *Intraface: Negotiating Gender-Relations in Agrobiodiversity*, in: FZG (FZG – Freiburger Zeitschrift für GeschlechterStudien), Jg. 22 (2016) Nr: 2, 85–105. DOI: https://doi.org/10.25595/3863.

Erstmalig hier erschienen / Initial publication here: https://doi.org/10.3224/fzg.v22i2.27058

GenderOpen – Repositorium für die Geschlechterforschung: www.genderopen.de

FREIE UNIVERSITÄT BERLIN

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Freiburger Zeitschrift für Geschlechterstudien 22/2: 85-105

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Intraface: Negotiating Gender-Relations in Agrobiodiversity

Abstract: The diversity of plants and animals in agriculture is a social-ecological artefact per se and the result of long-term interaction between humans and agrobiodiversity, displaying the material resistance of the latter. The conceptual framework intraface aims at the analysis of the gendered organization of varieties in an inter- and transdisciplinary research setting. The "negotiations at the intraface" contribute to synthesizing disciplinary perspectives and life-worldly knowledge with a focus on sustainability outcomes with special emphasis on gendered power and interests. The eminent loss of agrobiodiversity requires transdisciplinary knowledge integration for sustainable transformation. The procedure of intraface analysis is illustrated on the case of paddy-rice diversity in Kerala, South India.

Keywords: agrobiodiversity; negotiations; intraface analytic framework; transdisciplinarity; India.

Intraface:
Die Verhandlung von Geschlechterverhältnissen und Agrobiodiversität

Zusammenfassung: Die Vielfalt an Pflanzen und Tieren in der Landwirtschaft ist ein sozial-ökologisches Artefakt per se und das Ergebnis langfristiger Interaktionen zwischen Menschen und Agrobiodiversität, die durch materiellen Widerstand z.B. von Saatgut geformt ist. Der konzeptuelle Rahmen Intraface zielt auf die Analyse der gendered (geschlechtlichen) Organisation dieser Vielfalt in inter- und transdisziplinärer Forschung. Eine Analyse der „Verhandlungen am Intraface" tragen dazu bei, disziplinäre Perspektiven und lebensweltliches Wissen mit Fokus auf Nachhaltigkeit und geschlechtliche (gendered) Interessen zu synthetisieren. Der rasante Verlust an Artenvielfalt erfordert transdisziplinäre Wissensintegration für nachhaltige Ergebnisse. Das Prozedere der Intraface Analyse wird am Fall der Artenvielfalt von Reis in Südindien demonstriert und zeigt, wie die notwendige Wissensintegration über das Brückenkonzept Intraface ermöglicht wird.

Schlagwörter: Agrobiodiversität; Verhandlungen; Intraface; Indien; Transdsiziplinarität.

Introduction

We meet agrobiodiversity daily, for example in the form of bread we eat for breakfast. Embedded in the variety of the cereal is the breeding, selecting and planting by men and women over the last thirteen thousand years (Diamond 1997). This interaction with the material resistance of plants has turned plants into crops. Material resistance refers to the agency of things and organisms, challenging us to organize accordingly as will be expanded below (The material resistance of body and biodiversity, p. 90). Agrobiodiversity maintenance is a continuous process with deeply inserted notions of gender, as the handling of plants

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and animals are embedded in wider social structures. In this paper I suggest the analytical concept "intraface" as a conceptual framework for transdisciplinary analysis of gender in social-ecological research and exemplify it on the case of agrobiodiversity in Kerala, South India. The approach integrates the gender-dimension into an institutional analysis framework of natural resource management with a focus on sustainability. Agrobiodiversity as the diversity of plants and animals in agriculture is a social-ecological artefact per se and the result of long-term interaction between humans and non-human nature. Intraface tackles the puzzle of bridging separate knowledge domains by establishing the dynamic gendered negotiations as the explanandum. This paper proposes and illustrates intraface as a concept, still awaiting its empirical application.

I suggest a gendered analysis of the reproduction of agricultural diversity with a focus on the role of dynamic negotiations at the intraface governed by masculinities and femininities on the social interpretation of material circumstances. Intraface does so by constituting a social-ecological phenomenon – in this case agrobiodiversity – as having a double identity of a natural resource as well as a cultural asset with social characteristics while equally considering in a transdisciplinary fashion academic and laypersons knowledge. To unravel the "negotiations at the intraface", trans-, inter- and disciplinary perspectives informed by a distinctive gendered analysis of power and interests contribute towards the analysis. Finally, the integrated knowledge on the dynamic negotiations allows deriving transformation knowledge towards sustainability. Applying this perspective, the concept aims at revealing insights that are not elucidated by general frameworks focusing on either social or natural sciences. This paper sketches a trans- and interdisciplinary application of the intraface to the exemplary social-ecological artefact agrobiodiversity in South India. The intraface approach aims to mobilize different disciplinary and life-worldly knowledge to secure their contributions to the analysis of gendered negotiations. The intraface approach may allow for a comparative discussion across cases, for transcending barriers between academics and field practitioners and for deriving recommendations for transformation knowledge towards sustainability.

The Social-Ecological Artefact Agrobiodiversity

To illustrate the scope of such an exercise, I demonstrate intraface analysis using the case of the social-ecological artefact agrobiodiversity. Agrobiodiversity is the diversity and variability of living organisms, which contribute to food security, agriculture and the related knowledge base. The double identity of agrobiodiversity as a natural resource and as a cultural asset with social characteristics is a social-ecological hybrid in essence. Therefore, the regulation of agrobiodiversity requires differentiated approaches which reflect its social as well as the natural-material embeddedness. Contrary to extractable resources, the utilization of agrobiodiversity does not diminish, but rather determines its continuous existence, well encapsulated by the phrase "use it or lose it" (Kotschi 2007: 99). This is the paradoxical attribute of agrobiodiversity's social-ecological

constitution; it poses a central challenge to the social and institutional organization of agrobiodiversity regulation.

The rapid loss of landraces and diversity in agricultural systems, the diminishing of gendered knowledge on cultivars and the economic impoverishment of users and custodians of genetic wealth are a social-ecological problem. Younger generations show less interest in agrobiodiversity as it does not hold prestige nor often offer straightforward income possibilities (Schöley/Padmanabhan forthcoming). The genetic erosion in agriculture is accelerated by the failure of several regulating mechanisms. First, the demand of a growing population for food, water and land along with uncoordinated land use results in the degradation of natural resources. Second, the crowding out of local varieties through formalized breeding (Kotschi 2010) is accompanied by a change in property rights and use patterns with an asymmetric impact on gender relations, posing a threat to indigenous knowledge.. As formalized, individual titles gain currency, layered use-rights often serving as niches for marginal plants and planters disappear. Additionally, agrobiodiversity loss on the one hand implies the vanishing of varieties from the cropping portfolio; on the other hand, it threatens the experimental and practical knowledge of ecological, economic and social characteristics of local cultivars.

The problem of genetic erosion hits women in their practices to use and conserve agrobiodiversity through their knowledge for food security and income generation (Howard 2003). Putting agrobiodiversity into the context of sustainability asks specifically for the dimension of gender relations, intersecting with other categories of class, caste, etc.. Agrobiodiversity loss is caused by economic and ecological, institutional and sociological factors in complex and often unintended ways. Linking this dynamic phenomenon with the normative question of sustainability and fair gender relations is a highly contested issue. Interpretations of sustainability and gender differ due to interests, identity in terms of religion, caste, ethnicity, property rights, dependency and involvement, but also according to gender and age (see Nowak this volume). To rethink agrobiodiversity use and conservation from different disciplinary and transdisciplinary vantage points in the light of sustainability requires a method of knowledge integration. By illuminating the "negotiations at the intraface" contested knowledge is aligned according to a gendered analysis of interests and power.

Already by selecting a specific social-ecological problem, the normative foci are set and serve as a joint goal to be described and investigated. The development of transformation knowledge is a step towards addressing both the social and ecological loss of agrobiodiversity, stressing not only the need for conservation but more importantly societal innovations. Working on the transformation of the current destructive land use system towards sustainable practices, the gender perspective serves as a cross-cutting issue to organize, systematize and synthesize disciplinary results transforming them into instruments for sustainable development. A vital step in transdisciplinary research is the integration of different knowledge forms. This is by no means a trivial task, as Phillips (2011) points out in respect to co-production of knowledge. This applies to intraface in

two respects, as it is interested in the co-production at the intraface, but also in a transdisciplinary sense between researchers and non-scientists.

Gender Analysis and Sustainability Science

Sustainability sciences and gender studies are linked via the social-ecological and normative dimension. They resemble each other in structural and typological patterns. For a long time sustainability sciences have paradigmatically chosen to be natural sciences, claiming objectivity, (gender) neutrality and shielding off possible influences of gender-relations (Hofmeister et al. 2013). Sustainability research and gender studies are both constituted as dealing with normative issues, context and problem focused as well as oriented towards integration. Sustainability challenges science in its self-conception as value-free. It implies thinking about the future guided by ideas of inter- and intragenerational justice and implies openness and flexibility in options for action and creating futures. It further places high demands on the process and actors by which it is created. Transdisciplinarity integrates fragmented knowledge and presents itself as a strategy to recover scientific capabilities for problem solving.

Feminist inquiries call for a critical inspection of power and structures of dominance within each discipline. In the context of sustainability studies, the notion of gender bears two aspects. On the one hand, it analytically questions scientific concepts of nature and their implicit construction of gender-relation; on the other hand, it transports a strong normative component of claims to justice. Through questioning and criticizing conventional conceptualizations of human-nature relations, gender inquiries formulate an emancipatory claim to overcome inequalities (Momsen et al. 2013). Disciplines have theorized and incorporated gender analysis to different degrees, thus allowing or hindering interdisciplinary cooperation and integration. Social-ecological research regards gender-relations as situated in specific contexts and perceived through the lens of a certain problem constellation. An interdisciplinary reading of the category gender operates around the nature vs. culture difference as a converging point of various disciplinary descriptions and definitions. Therefore, it is necessary to describe gender-relations in the historical situation of daily practices again and again (Becker/Jahn 2006: 233). For the sake of intraface analysis, gender encapsulates culture-specific notions of feminity and masculinity intertwined with conceptualization of nature and the body, intersecting among others with class, caste and ethnicity through process, structure and relations.

Social-ecological research supposes gender equity as a central means and outcome of sustainability (Schultz et al. 2010). Therefore, the different specifications of gender relations and their deeper constitutional impact on societal relations to nature and their biophysical-ecological dynamics are central. Social-ecological research views gender as an interdisciplinary category to convey scientific cultures and as a transdisciplinary one to link scientific and everyday knowledge (Mölders 2010:75). The gender dimension serves as a common denominator and thus a bridging concept in a theoretical and methodological manner. Gender

analysis forces disciplines to reflect, expand, accommodate and push boundaries for theoretical and methodological developments. The engagement with gender is a constant challenge because it is contested, fluid and changing over time. The focus is thus on the expression of femininities and masculinities, i.e. what makes a man or a woman in a specific context.

The distinction between sex and gender is a reaction to the rhetoric of naturalizing women, thus transferring the Eurocentric nature vs. culture paradigm and its inherent hierarchy to gender-relations. The notion of gender signals that the hierarchies embedded in the dualism man vs. woman are not taken as biological given, but rather socially created and thus subject to change. Gender can be conceptualized along three dimensions which highlight different, but fundamentally additional aspects. Gender is a process category, a structural category and a relational category (Moeckli/Braun 2001, Kolar and Baerlocher this volume). Gender as a process category is an outcome of social interaction of individuals, which produces gender in every encounter. One is rather "doing" than "being" gender. In this tradition the feminist critique on natural sciences focuses on scientific ways of naturalizing gender and influencing the construction of difference (Subramaniam 2014). Gender as a structural category is recognized as a principle of organizing society, positioning men and women in hierarchical relationships. Therefore, it is important to consider both bodily men and women in the analysis of social and political institutions and how their relationship is shaped and enforced for example by institutions like caste. The emerging masculinities and femininities appear as expressions of gender as "a field of structured and structuring difference […] of extreme localization, of the intimate personal and individualized body […]" (Haraway 1988: 588). Gender as a relational category sets an analytical focus on differences, hierarchies and exclusions in societal arenas, taking also into account the specific context and the organization of intimacy like the body, health and reproduction. This perspective is especially applicable for transdisciplinary enquiries, as the construction of gender-relations appears as a result of the interaction of life-world perceptions and scientific knowledge in their specific cultural, historical and political expressions. As transdisciplinary knowledge aims to be relevant for more sustainable outcomes, strategies for problem solution have to be context and – as I do argue – gender-relation specific.

However, beside all critical reflexive knowledge on the construction of gender, in our case study of agrobiodiversity we are confronted with the lifeworld of bodily humans in Wayanad, governed by strong heteronormativity and stratification via caste. The material handling of seeds, plants and knowledge is organized within this dominant patriarchal context. Thus the division of labor follows rigid sex segregation, though the pattern may vary between communities, i.e. Christian settlers and various Adivasi groups. We are aware of the unstable and mobile nature of gender, entangled with multiple processes of producing identities, power and inequalities (Elmhirst/Darmastuti 2015). For operationalizing gender for empirical research in South India, we work with the self-identified subjectivities heavily influenced by processes homogenizing group identities, regulating gender and ethnicity.

The Material Resistance of Body and Biodiversity

For male and female agriculturalists matter always mattered. Nature is not the silent, blank resource for the exploits of culture, but an agentive, signifying force (Haraway 1988). What I term material resistance is the idiosyncratic characteristic of plants, animals and people bodies to social acting. Just like "dead" material, the living matter poses challenges to making sense and a living in a lifeworldly manner. In this sense resources are a source for regeneration and possibilities in abundance. The abundant source turns into scarce resource when interests come into play. The competition over access and exclusion, use and commodification, distribution and lack points to the involved interests in certain parts of nature. Resource thus reads as a specific interest in living and dead materiality which needs to be unpacked. Haraway (1988: 591) reminds us in her seminal paper on situated knowledge of the particularity and embodiment of all knowledge. Instead of claiming an innocent epistemological position, even subjugated ones can only present embodied objectivity. Rather the feminist limited location creates situated knowledge, which is able to be called into account. These politics and epistemologies of location, positioning and situating acknowledge partiality as a condition to make knowledge claims. In this vein material feminism perceives nature as agentic and its acts have consequences for the human and non-human world (Alaimo/Hekman 2008). The "material turn" in feminist thought aims at bringing back the material into science without losing sight of social constructivism. A new way of understanding the relationship between discourse and matter does not privilege the former to the exclusion of the latter. By doing so, material feminism wants to introduce ethics that overcome the paralysis of cultural relativism. Mind and matter are mutually co-constructed in an on-going process (Wilson 2008).

In her concept of agential realism Barad (2003) asks "how matter comes to matter". She suggests a post-humanist, performative approach to analyze techno-scientific and natural-cultural practices while recognizing the dynamic force of the material. She shifts the focus away from the questions of the representation of reality to practices, actions and doing. A central term in her theory is the notion of intra-action, pointing to the material as an active agent in the world, instead of being kept apart by delineating and maintaining borders between i.e. humans and non-humans. Intra-actions are material, discursive, human, more-than–human, corporal and technological. This posthumanist perspective moves beyond the exemplary situation of humans, but places them among other beings and material. It asks how the border between nature and culture is drawn and continuously maintained. Moreover, nature is pictured as active and having a history on its own. With intra-actions Barad underlines the entity of all human and non-human subjects.

The co-constitutive materiality of human corporality and non-human natures leaves behind the nature-as-wilderness model and rather embraces the materiality of humans, non-humans and material substance as actors. Nevertheless, Grossmann (forthcoming) rightly points to the lack of operationalization of material feminist concepts in empirical research. If "practices are, by nature,

embodied, situated actions" (Alaimo/Hekman 2008: 7), we may start by considering properties of nature components and characteristics of gendered actors who come together in the here and now. Materials like living plants and animals as in agrobiodiversity, but also the soil texture of the paddy field forces organization around particular material resistances. The material resistance of body and biodiversity asks us to consider anew the "relations between body, mind and landscape" (Mortimer-Sandilands 2008). At the "negotiations at the intraface" the influence of scientific framings and the inherent power structures of gender-relations are contested and simultaneously merged. Intraface considers both as situated knowledge (Haraway 1988).

Knowledge Integration in Transdisciplinary Research

Requirements of transdisciplinary research for transformation knowledge give rise to the need for integration in a methodological way. Transdisciplinary research swings between two polar opposites. On the one hand, the life-world research approach pays attention to the participatory involvement of stakeholders in contributing to problem solving in the life-world (Burger/Zierhofer 2007). On the other hand, the science centered research approach starts from debates within academia. An integrated research approach – like social-ecological research – pursues both epistemological orientations simultaneously. The thus arising tension between practical expertise and theoretical frontiers requires a method to integrate both ends of the range of knowledge creation. The intraface approach suggests a multitude of knowledge claims with preeminence given to inherent gendered connotations.

Integration is a fundamental requirement for transdisciplinary research, a scientific principle juxtaposing the continuous differentiation and specialization in science (Bergmann et al. 2012). The dynamic between differentiation and integration appears to be a constitutive characteristic of transdisciplinary science and is in need of a methodological procedure to achieve this. The combination of knowledge domains from various disciplines requires scientific methods of integration (for example, through the development of bridging concepts like the proposed intraface) the more so if social-ecological issues are at stake and non-academic knowledge is involved. As transdisciplinary research aims to provide solutions to social problems not fitting into disciplinary specializations, the task of integration requires communication to overcome terminological differences, coordination of knowledge domains, identification and investigation of knowledge gaps, and creation of methods to establish a common idea of the problem and its parts (Christinck/Padmanabhan 2013). Transdisciplinary research pools specialized disciplines and focuses on very specific, concrete problem constellations.

The Concept of Intraface: Gendered Social Interpretation of Material Circumstances

The concept of intraface places the negotiations over gendered rules at the centre of the analysis (Padmanabhan 2002). The linkage between institutional and gender analysis offers insights into the social organization of social-ecological issues. Gender is a central variable since the institutional environment of rules and regulations differs by gender, intersectioned (see Nowack this volume) by class and caste, as property rights and power, work and responsibilities, and knowledge and values vary accordingly. In the following I want to delineate the ontological pedigree of intraface from the concept interface (Long/Long 1993) and its distinguishing features as well as other influences from institutional analysis.

Norman Long's (2001) concept of the "interface" grounded in development sociology serves as the foundation for intraface. Resting in the tradition of sociology of knowledge, interface is used as a metaphor for the places where knowledge about identity and the world is contested and altered. Interface is rooted in the school of symbolic interaction, which regards the process of interaction in the formation of meanings for individuals as symbolic (Blumer 1969). Attaching meaning is achieved via language and thought and is best observed in humans' practical, interactive relation to their environment and respective sense making. Interface defines the social space where different life-worlds encounter each other. Long developed this concept to analyze the typical situations of different expectations, knowledge claims and aims in a development context, to reconstruct strategies and rationalities of actors. In this vein, interfaces looks for the structural conditions of development actors and frames these processes of interaction as fields of conflict and negotiations.

Gerharz (2014) places interface as a methodology in the tradition of sociology of knowledge. Interface enables to reconstruct and comprehend rationalities and strategies of actors in situations where diverse knowledge claims and expectations meet. It is designed to reveal structural aspects of development cooperation, understand actions of actors and to view processes as fields of conflict and negotiations. Interfaces appear in social situations where actors of different rationalities meet: Their perspectives, world visions and experiences differ as well as power endowments. This has consequences for the significance of induced social change aiming at society's structure. While interface emphasizes the autonomy of actors, the significance of masculinity and femininity in creating meaning is neglected.

However, intraface goes beyond the description of critical points of intersection between life-worlds, social fields, or levels of social organization. Intraface focuses on the gendered asymmetries embedded in social institutions. I find it necessary to specifically highlight the intersection of power(-lessness) according to class and caste entangled with the category gender. Therefore, intraface as an analytical term assigns importance to situated actors with overlapping identities in a gendered setting. Actors' rationalities do differ not only because of class and caste structures, but due to asymmetrical gendered norms and values.

From a sociological point of view, intrafaces capture the gendered conflicting and coercive interests (Padmanabhan 2005). However, my usage of intraface stresses the simultaneous intersectional sameness but gendered difference of human actors.

Inspired by the framing of knowledge encounters, I thought of intraface as the place where the insider/outsider distinction is read along lines of gender in an intersectional fashion. The concept of intraface is able to identify and unravel the negotiations over masculinities and femininities within one life-world on the basis of the social interpretation of material circumstances like natural resources. To analyze the link between the social organization of environmental coordination and the social category of gender, I introduce the term intraface into the "Institutions of Sustainability" (IoS) framework by Hagedorn et al. (2002). In the tradition of classical institutional economics, the conceptual framework dissects the linkage between the natural good and human actors. The IoS captures the dual character of social-ecological systems by asking for the relationship of the properties of transaction of nature components and the characteristic of actors to understand systems performance. It proposes four groups of determinants of institutional change towards sustainability: (1) properties, features and implications of transactions related to nature and the ecosystem; (2) characteristics and objectives of the actors involved in those transactions; (3) the design and distribution of property rights over nature components; and (4) governance structures for agro-environmental relations. The transdisciplinary boundary concept of intraface zooms into these aspects of differences in assets, power, interests, property rights, and resulting negotiations within this institutional framework. Thus, the intraface approach is able to show the dynamic of these negotiations between actors on gendered sustainability outcomes.

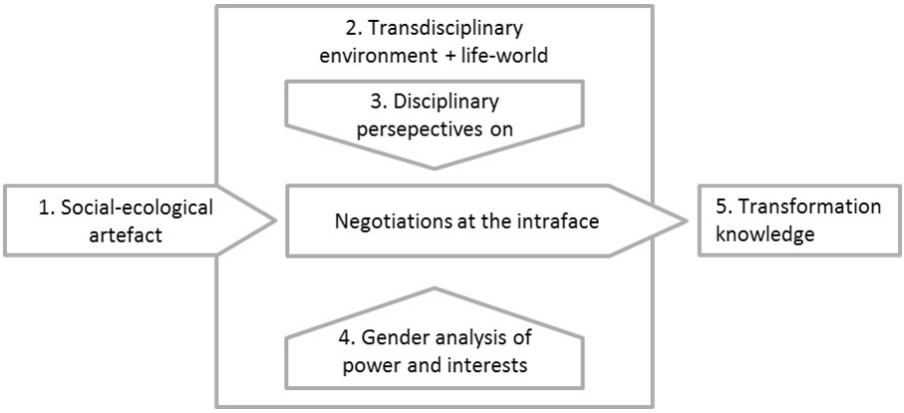

Fig. 1. Negotiations at the intraface (Nal)

Negotiations at the Intraface

Intraface analysis starts off with defining the (1.) social-ecological artefact at hand, which in this case is agrobiodiversity as a mutual cultural asset and natural resource. We will illustrate this with findings from rice-systems in South India. This artefact is embedded in a (2.) transdisciplinary environment and several life worlds, where laypersons like small scale male farmers as well as experts like female breeders attach different meanings to the artefact, thereby expressing the multilayered societal relations to nature. At the "negotiations at the intraface" the influence of scientific framings and the inherent power structures of gender-relations are contested and simultaneously merged. Intraface considers both as situated knowledge (Haraway 1988). Thus (3.) disciplinary perspectives and (4.) a gender analysis of power and interests feed into the "negotiations at the intraface" to produce (5.) transformation knowledge. Therefore, professional and lay actors negotiate at the intraface in a transdisciplinary manner. For conducting an intraface analysis I propose the following analytical questions and will exemplify it at the example of agrobiodiversity in South India:

1. What is the problem description of the social-ecological issue for NaI?
2. Who and what generates tacit knowledge in the transdisciplinary life-world of NaI?
3. What are the disciplinary terms and theories relevant to NaI?
4. What gendered values and means of negotiations do actors have at NaI?
5. What is the emerging transformation knowledge integrated across disciplines?

Intraface analyzes gender-relations and the potentials for change around the social construction of human-nature relations. The concept "intraface" describes the negotiations of actors over gendered social orders within their life-world and allows for a systematic description of differences and similarities of power and interests. Intraface situates the dimension gender at the centre of analysis, i.e. of the social dilemma of agrobiodiversity maintenance and the search for equitable instruments of governance. The boundary spanning concept intraface provides a framework to bundle social and natural science, i.e. ecological, sociological, economic and institutional terms and methods, towards a shared understanding of the system. Intraface is intended to bundle contributions from single disciplinary approaches towards gendered human-nature relations. It sets up a reference matrix to capitalize on the dialogue between disciplines and practitioners. Intraface views the anthropogenic dealing with – for example – agrobiodiversity as a societal tension with the resisting natural phenomenon and is interested precisely in this tension.

Since the negotiations concerned take place between genders within a shared life-world, intraface is a succinct concept for describing both the situation of cultural, ethnic, and life-world sameness and the gendered differences. Intraface is a critical point at which different normative values and interests within

entities of social groups occur. At intrafaces we observe cooperation alongside obvious and subtle conflicts within. The analysis of the intraface is concerned with negotiations and power issues between actors sharing a common life-world. For example, do male and female farmers interact with the same nature components for their reference but encounter different social structures and norms due to their gender. The term intraface covers the simultaneity of the commonly perceived framework of a group of actors and the distinct room to maneuver according to respective masculinities and femininities. Thus, the sociological concept of intraface incorporates the gender dimension into the institutional analysis. The focus is on situations in which different perceptions encounter each other and on the subsequent process of negotiation.

The intrafaces appear along with gendered actors, who might hold contradictory views about the validity, significance, completeness and appropriateness of different contents and forms of knowledge. The researcher has to reflect this in the design of the study, the choice of topic and focus, informants and translators and, finally, data analysis. The intraface brings to the forefront the social embeddedness of scientific and local knowledge and asks for reflexivity. Negotiations at the intraface are concerned with existing knowledge in the pursuit to create transformation knowledge. At the core, negotiations at the intraface arise around the questions of 1) what is the issue, 2) what is legitimate, 3) what is valid, 4) what is the goal and 5) who contributes, who benefits in the long run? By conducting an intraface analysis, disciplines are challenged to enter a discourse of methodological, ontological and epistemological nature.

The concept of intraface sets the analytical focus on negotiations of formal and informal gendered rules. Institutions and rules are contested at the intraface, which makes gendered interests and negotiations observable. Power relations differ not only between actor groups but also within a group. Bargaining power and access to information as well as voice differ greatly between men and women. For example, decisions made by men in agrobiodiversity management e.g. regarding crop rotation or species selection may influence women's food security and fallback position. The social construction of nature and gender are important ideological devices to perpetuate asymmetries in decision-making.

The eminent loss of agrobiodiversity requires transdisciplinary knowledge integration for a transformation towards sustainability. Sustainability research requires the integration of scientific knowledge from different disciplines and practical know-how of various stakeholders (Hunecke 2011). Transdisciplinarity rethinks the relationship between science and society and changes the mode of research into one of a knowledge network, linking academic and non-academic actors around a problem in a discursive manner (Dusseldorp/Sautter 2011). As transdisciplinarity aims at contributing to problem solving, transformation knowledge – defined as the operational strategies of achieving sustainability goals under existing conditions – is without gender analysis and a gendered problem framing less likely to be attained. The users of transformation knowledge always happen to be gendered. Thus taking the category gender into account

demands to rethink the expectations, experiences and possible consequences of knowledge outcomes. Gender-relations act as a marker for social differences and intersectionality in general (Becker/Jahn 2006, see Kaijser and Kronsell this volume). Therefore, transformation knowledge needs to be gender-specific to produce problem solving strategies that are context sensitive and thus relevant. In the following I want to delineate how intraface is able to support the synthesis and integration of contributions from different disciplinary origins.

Integrating Institutions and Gender for Sustainability

The analytical questions posed to "negotiations at the intraface" prepare the integration of different trans- and disciplinary contributions towards a transdisciplinary synthesis. Gendered interactions between nature and actors as well as institutions of environmental coordination contribute to understanding gendered negotiations at the interface. Merging the sociological perspective with the institutional approach overcomes altruistic and reductionist assumptions about the household as a gender-neutral site (Waller/Jennings 1990) and differentiates the process of negotiation on the grounds of an actor's power, property rights, and co-ordination. The Institutions of Sustainability framework (IoS) serves as a heuristic framework to organize the inquiry into institutions that affect the natural environment and ecological systems through production and consumption activities and self-organization (Hagedorn et al. 2002).

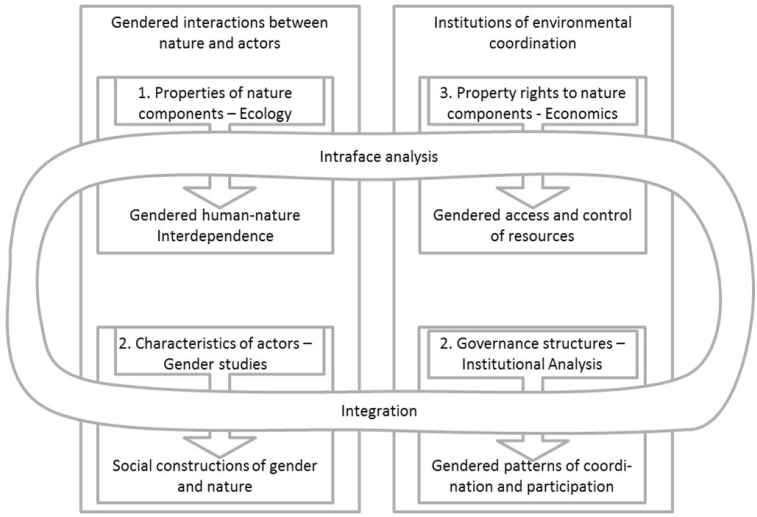

Fig. 2. Intraface and the conceptual framework for institutional and gender analysis (based on Hagedorn et al. 2002 and Padmanabhan 2005)

The gendered interactions between nature and actors are of concern in the left column of the heuristic framework. What has become labeled as material feminism is debated in development studies and rural sociology as the properties of nature components and their resulting effects on human-nature interdependencies. Informed by a critical perspective on the social construction of gendered actors and nature we may understand agrobiodiversity practices like selecting, storing and consuming as the bodily performance within a patriarchal structure evoking particular situated masculinities and femininities. The right column asks for the institutions that mediate the interaction between gendered bodies and environmental material via regimes of access, control and participation.

An integration concept starts from the analytical core of terms and takes care of securing compatibility with social as well as with natural science approaches. In intraface analysis the starting point lies in the disciplinary elaboration of the term gender. It is vital to link the concept to disciplinary terms and theories (Padmanabhan et al. 2010). Considering "negotiations at the intraface" is thus a first step towards synthesizing transdisciplinary and disciplinary knowledge in an interdisciplinary fashion. The critical contribution of the intraface to different disciplines is the extracting of the rich knowledge on gender-relations from within disciplines and practices. The unearthing of knowledge and its conditionality provides for the necessary debate among interdisciplinary researchers to arrive at a synthesis.

Negotiating Agrobiodiversity at the Intraface

In the following I suggest ways to make the notion of intraface productive by linking it to the disciplinary contexts of ecology, economics, institutions and governance. This illustrates the possibility of integration via intraface. Intraface engenders the institutional analysis of human-nature interaction. Four dimensions influence the institutional arrangements in resource management in a specific context. The case of agrobiodiversity in South India demonstrates the gendered lens of intraface analysis:

Ecology: Gendered Human/Nature Interdependence

Gendered interactions between nature and actors are shaped by the properties of nature's components and its material resistance. For example, agroecology illuminates the interaction of anthropogenic utilization and ecological dynamics (Ghazoul 2007). The human-nature interdependence finds its expression in farmer's gendered knowledge and management practices. Ethnobiology has emerged as a hybrid discipline to design and implement more inclusive research by considering gender-based spatial and temporal exposure to ecosystems resulting in gendered ecological knowledge (Pfeiffer/Butz 2005). To explore the ecological and agricultural knowledge of local people and social transformation processes Betz et al. (2014) developed the social-ecological web as a bridging concept to integrate

knowledge from social and natural sciences. The social-ecological web is a useful method to highlight differences between communities, to foster interdisciplinary analysis of both social and ecological changes, and to reflect on the challenges of integrating several disciplines and stakeholders.

Women's responsibilities in and knowledge of biodiversity management is widely documented (Howard 2003), as is their variation among contexts and cultures. Emerging as common to women's contribution to agrobiodiversity management is that the selection, storing, pruning, tending and other activities are generally not considered actions in their own right, but rather extensions of women's reproductive cores. Such intellectual and manual tasks become invisible when transactions take place in the realm of another reproductive task. This is particularly the case of the Adivasis Paniya, landless daily wage laborers or wild food gathers in Wayanad, South India: The tacit knowledge women apply to their work is not perceived as an additional value added to a specific site but as an extension of "women's nature." The false perception of women's work as their essential character and not as a part of their labor is still a powerful tool to dilute women's contributions and respective claims (Padmanabhan 2011).

Gender Studies: Social Construction of Gender and Nature

Gendered interactions between nature and actors are influenced by the characteristics of actors and how they construct the relationship between gender and nature (Moeckli/Braun 2001). Rural sociology and gender studies provide two aspects towards the understanding of social-ecological issues: the analysis of gender relations de-naturalizes power relations between genders, thus pointing at socially crafted and therefore changeable inequalities (Agarwal 1991). Furthermore, feminist epistemologies demand for dealing with objectivity, subjectivity and reflexivity of research (Kunze/Padmanabhan 2014), thus offering a foundation for the cooperation of disciplines (Jackson 2006). The analysis of intrafaces creates insights into the social organization of agrobiodiversity and the human struggles with the double trouble of being social-ecological beings.

Agrarian change and social reorganization reshape gender-nature relations in the Adivasi community of Kuruma in Wayanad, India (Kunze forthcoming). Gendered subjectivities question the socially constructed image of women being closer to nature or protectors of agrobiodiversity, as this aspect plays a less significant role in the everyday lives of Kuruma women. Instead, it is rather men who reinforce the dichotomy between traditional/modern agriculture. They construct a self-identity of Kuruma people as being "traditional agriculturalists" cultivating sustainably in environmental and economic terms. Agriculture is categorized as a masculine domain which not only constitutes social relations of power and authority between female and male Kuruma farmers but also denies women the right to claim agricultural knowledge. Kuruma women's subjectivities are now strongly reshaped by social reorganization determined by access to education, mobility and increased employment opportunities. The construction

of women as conservers overlooks their agency for change and their rejection of care responsibilities.

Economics: Gendered Access and Control of Resource

Property rights to nature's components are an outcome of institutions of environmental coordination. They decide about access to and control over benefit streams, which may vary decisively between genders in intersectional ways. They may limit women's stake in decision-making through particular property rights institutions or grant them access through common pool titles. Household decision-making affects the welfare of individuals under conditions of socially generated gender asymmetries in access to opportunity, power and assets (Quisumbing 2003). The intraface can be observed at the analysis of gender-relations and the potentials for change in terms of welfare, employment and income as well as indirect benefit streams like ecosystem services (see Kolar/Baerlocher this volume).

For example access to seeds is crucial and we observe the exclusion of women across caste and class from formal seed networks in the case of Wayanad, South India (Schöley/Padmanabhan forthcoming). The handling of seeds and exchange highlights the gendered organization of agrobiodiversity. Masculinities and femininities differ in the face of coexisting formal and informal institutions seed systems in Wayanad. Male farmers draw on a larger number of paddy seed source. Their social networks include the formal breeding system as well as landraces selected from farmers' fields. In contrast, women farmers procure rice seed by and large from within informal networks. Women collaborate not only on the field but also in seed storage, thus actually taking care of and acting out on maintenance. Both men and women heavily depend on collaboration in their paddy cultivation and seed management strategies, with joint purchase of seeds on the formal market by pooling transport. The differentiated collaboration patterns demonstrate that paddy cultivation relies on cooperation, a consequence of ecological requirements and resulting material resistance. Interestingly, this ability of men to choose from a wider array of seed sources is evident across different Adivasi communities. Shared masculinities dominate access and control. All communities report a shrinking concern of younger farmers in seed management.

Governance Structures: Gendered Patterns of Co-ordination and Participation

The governance structures of agrobiodiversity centre on cooperation and coordination with implicit gendered rules and regulations (Padmanabhan/Jungcurt 2012). Governance structures include institutions of environmental coordination which lead to gendered patterns of participation. Power becomes a central focus of inquiry in the analysis of institutions in order to describe and understand how institutions embody certain sets of gendered power relations. Looking at the

institutional nature of gender is one promising approach to studying gender and the environment (Zein-Elabdin 1996). Intrafaces arise when connecting gender, institutions and power to establish gender as a crucial dimension of how norms operate within institutions.

In Kerala, South India, Suma/Großmann (forthcoming) observe an increased participation of women in political bodies, while at the same time their agro-ecological knowledge is neglected and disempowered. Within ongoing processes of decentralization, rural local councils (Panchayats) have been revitalized and a number of institutions of local self-government, including women's self-help groups (Kudumbasree) established. Kudumbasree in Wayanad enhance women's presence, representation and decision-making power as well as their self-confidence and capacities. Women's farming groups upgraded women from the position of agricultural laborers to group farmers as well as giving women at least access to land and agricultural credit systems. Yet the latter tend to reproduce asymmetrically gendered power relations in agricultural production and minimize women's management for agriculture. Men still hold virtually all of the decision-making power over the most valuable resources: seeds and land. Kurichya women have vast knowledge about rice cultivation, but cannot use it for actively cultivating rice on their own, as they have no access to traditional rice seeds and land in the rainy season. However, integration and enhancement of the traditional knowledge of Kurichya women in the state-designed women's group program has not been taking place, as it promotes high-yielding seeds and fertilizers. In fact, some women have now become the vehicle for introducing high-yielding seeds and fertilizers into local agricultural practices, as it is impossible for them to access traditional rice seed regarded and guarded as the domain of men. Therefore, the widely held notion of women being preservers of agrobiodiversity does not seem to be in evidence in the case of Kurichya women and traditional rice-seed varieties.

Analyzing negotiations at the intraface occurring over the meaning of agrobiodiversity reveals the material resistance of the social-ecological artefact to illuminate the social interests in gendering nature components and related actions. This multifaceted debate at the intraface provides a shared understanding of the symbolic interaction over agrobiodiversity. Thinking about different dimensions of agrobiodiversity as a gendered issue is the puzzle intraface aims to solve in a transdisciplinary manner to foster sustainability outcomes. Following the analytical questions proposed to reveal the negotiations at the intraface in the case of agrobiodiversity in Wayanad, India, we observe a contested landscape around the material resistance of seeds.

1 The emerging social-ecological issue is the vital seed that relies nevertheless on humans' gendered interests and capabilities to continue as the source for a diverse agriculture. The intraface helps to arrive at an inter- and transdisciplinary problem description.

2 In the exemplary case of rice-farming in the district of Kerala, especially Adivasi farmers stock not only the material seed but accompanying tacit knowledge on storing, planting, processing etc. according to the gendered division of labor and access rights. Intraface analysis enables to look into the knowledge and material dynamics behind patriarchal norms.
3 To capture the material resistance of agrobiodiversity, ecological, economic and social concepts frame the inquiry, whereby the challenge of all inter- and transdisciplinary endeavor remains in integrating different knowledge claims of contributing disciplines at the intraface into a coherent narrative.
4 Intraface analysis shows the different institutional and normative mechanisms at work to amplify or negate contributions to agrobiodiversity by stating and institutionalizing knowledge claims as in the case of Adivasi masculinities.
5 Last not least, the analysis of negotiations at the intraface provides a common ground to derive transformations knowledge. Showing the knowledge linked to notions of femininity and masculinity and subversive circumvention of this confinement highlights possibilities but also dangers in ignoring the gendered connotation of negotiations at the intraface.

Intraface Analysis for Transformation Towards Sustainability

The development of the conceptual term intraface in this paper has been exemplified on the example of agrobiodiversity. Establishing intraface as a bridging concept serves the process of knowledge integration. A bridging concept is a common conceptual framework and links researchers in an analytical way in the joint research- process (Deppisch/Hasibovic 2013).

We may distinguish three phases of this transdisciplinary process (Jahn et al. 2012). Problem transformation is the first step from an identified real-world problem to an academically framed research agenda. It is an iterative process, moving between building research theory and reconnecting it to the real-life situation. Here intraface can provide orientation by jointly arriving at a working definition of the social-ecological artefact. Second, interdisciplinary integration requires identifying, explicating and recognizing differences, such as between different scientific disciplines and schools of thought. Here intraface proposes gendered interests and power as a boundary object for integration. Last not least, transdisciplinary integration requires dialogue and action-based tools for integrating the knowledge, views, values and skills of non-academic and academic stakeholders alike. In this vain "negotiations at the intraface" are meant literally, it makes implicit gendered assumptions available for analytical scrutiny. The task of integration has to be achieved at various levels simultaneously: on the epistemic, i.e. recognizing the limits of concepts or findings, regarding social-organizational by connecting and reconciling structures and on the communicative level by finding a 'common language.'

So far I have proposed intraface analysis and illustrated it at the example of agrobiodiversity for its capacity to compare across multiple case studies, to

transcend knowledge barriers and to serve as a bridging concept to contribute transformation knowledge to social-ecological problems.

Acknowledgements

Funding by BMBF 01UU0908 is duly acknowledged. I am indebted to constructive comments by Tanja Mölders, Daniela Gottschlich and Isabelle Kunze on earlier drafts. I enjoyed helpful feedback from co-authors, anonymous reviewers and editors of this special issue, especially during the writeshop.

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