

Motofish and Trashfish: Food values and rifts at the agrarian frontier

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Abstract

At the resource frontier of Prey Lang Forest in Cambodia, a new food regime marks multiple rifts in the social fabric. As the forest gives way to rural road development, migrant incursions, and cash cropping, long-term residents lament the paucity of available food. At the same time, new migrants suggest that there is now more food than ever. Based on how food is defined, we find one food, motofish, that emerged as a significant semiotic sign. It is a fish, regardless of species, that is farm-raised and carried from the market to the village by motorbike. It is opposed to a real fish that grows by itself in a river or stream. Long-term Kuy and Khmer residents of the forest see the fish as a sign of destruction and loss, because there are so few fish in the rivers and streams. New migrants see motofish as part of a new abundance coming to this remote corner of the world where there used to be no food. This abundance is facilitated by Cambodia's growing fish farming industry, fed by wild-harvested 'trashfish' and subsidized soy pellets. Motofish is more than a sign of gastropolitics, as it marks a rift in the semiotic landscape through which individual and collective worlds emerge. We use this worldmaking fish to launch a discussion of both the epistemic and metabolic rifts of agrarian transformation and how these rifts are interpreted by different actors in the same landscape: One that recognizes the metabolic rift and the other that carries with them its epistemic cleansing.

Keywords: Metabolic rift, epistemic rift, Cambodia, Kuy, development, religion

Resumé

A la frontière des ressources de la forêt de Prey Lang, un nouveau régime alimentaire marque de multiples ruptures dans le tissu social. Alors que la forêt cède la place au développement de routes rurales, aux incursions de migrants et aux cultures commerciales, les résidents de longue date déplorent la rareté de la nourriture disponible. Dans le même temps, les nouveaux migrants suggèrent qu'il y a maintenant plus de nourriture que jamais. Sur la base de la définition de la nourriture, nous trouvons un aliment, le motofish, qui est apparu comme un signe sémiotique. Un poisson, quelle que soit son espèce, qui est élevé à la ferme et transporté du marché au village en moto est un motofish. Il s'oppose à un vrai poisson qui grandit tout seul dans une rivière ou un ruisseau. Les résidents Kuy et Khmer de longue date de la forêt voient le poisson comme un signe de destruction et de perte, car il y a si peu de poissons dans les rivières et les ruisseaux. Les nouveaux migrants voient le motofish comme faisant partie d'une nouvelle abondance venant dans ce coin reculé du monde où il n'y avait pas de nourriture. Cette abondance est facilitée par une industrie piscicole en pleine croissance, alimentée par des « poissons poubelles » récoltés dans la nature et des granulés de soja subventionnés. Motofish

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est plus qu'un signe de gastropolitique, car il marque une rupture dans le paysage sémiotique à travers lequel émergent les mondes individuels et collectifs. Nous utilisons ce poisson créateur de mondes pour lancer une discussion à la fois sur les ruptures épistémiques et métaboliques de la transformation agraire et sur la manière dont ces ruptures sont interprétées par différents acteurs dans le même paysage: l'un qui reconnaît la rupture métabolique et l'autre qui porte avec lui son nettoyage épistémique.

Mots clés: Rupture de l'échange métabolique, division épistémique, Cambodge, Kuy, développement, religion

Resumen

En la frontera de recursos de Prey Lang Forest, un nuevo régimen alimentario marca múltiples fisuras en el tejido social. A medida que el bosque da paso al desarrollo de caminos rurales, incursiones de inmigrantes y cultivos comerciales, los residentes a largo plazo lamentan la escasez de alimentos disponibles. Al mismo tiempo, los nuevos migrantes sugieren que ahora hay más comida que nunca. Basándonos en cómo se define la comida, encontramos una comida, pez moto, que surgió como un signo semiótica. Un pez, independientemente de la especie, que se cría en una granja y se lleva del mercado al pueblo en motocicleta es un pez moto. Se opone a un pez real que crece solo en un río o arroyo. Los residentes kuy y khmer de larga data en el bosque ven a los peces como un signo de destrucción y pérdida, porque hay muy pocos peces en los ríos y arroyos. Los nuevos migrantes ven a los peces moto como parte de una nueva abundancia que llega a este remoto rincón del mundo donde antes no había comida. Esta abundancia se ve facilitada por una creciente industria de piscicultura, alimentada por "morralla" silvestre y gránulos de soya subsidiados. Motofish es más que un signo de gastropolítica, ya que marca una grieta en el paisaje semiótico a través del cual emergen mundos individuales y colectivos. Utilizamos este pez creador de mundos para iniciar una discusión sobre las fisuras epistémicas y metabólicas de la transformación agraria y cómo estas fisuras son interpretadas por diferentes actores en el mismo paisaje: uno que reconoce la fisura metabólica y el otro que lleva consigo su limpieza epistémica.

Palabras claves: Ruptura metabólica, ruptura epistémica, Camboya, Kuy, desarrollo, religión

1. Introduction

In the context of rapid development and reluctant conservation, the northern regions of Cambodia's vast Prey Lang Forest are transforming from mosaic forest landscapes into single-crop agricultural land. Prey Lang is the last remaining lowland forest in the Southeast Asian mainland. Spanning over 900,000 ha in 2009 (A.T, 2009), the forest at that time was inhabited by approximately 250,000 Kuy indigenous and Khmer people practicing blended systems of paddy and shifting rice cultivation, supplemented by hunting and fishing, gathering, husbandry, and gardening (Turreira-García *et al.*, 2017). Between 2007 and 2012, over 275,000 hectares around the forest's perimeter were awarded for Economic Land Concessions (ELC) by the Ministry of Agriculture, Forestry, and Fisheries (MAFF) (Work & Thuon, 2017).² Across Cambodia, these Economic Land Concessions caused more social and ecological damage than economic growth (Hak *et al.*, 2018; Jiao *et al.*, 2015; Tucker, 2015) and were suspended in 2012. In 2016 the Ministry of Environment (MoE) grabbed Cambodia's remaining forest areas for conservation and as part of this act established the 432,000 hectare Prey Lang Wildlife Sanctuary (PLWS). This conservation grab has not stopped forest transformation, but ELC are no longer the primary driver of land-use change. The story we draw out in this paper comes from the now-barely forested northeast quadrant of that large forest, heavily impacted since 2015 by the twin forces of rural road infrastructure and the rapid increase in internal migrants. At first it was Vietnamese logging companies who came in the 1990s, then in the early 2000s, big Cambodian companies moved in. These cut rough trails deep into the forest widening the footpaths and ox-cart trails. In 2004 a Vietnamese mining company widened the road for standard transport vehicles.³ Forest trails and local market activities continue to be shaped by logging, but also through the traders that started traveling along the logging roads, buying and selling through the newly opened trails. Traders bought buffalo and sold tractors, and they told of cassava and cashew markets

² See the Licadho maps for the latest data on ELC and deforestation, at https://www.licadho-cambodia.org/land_concessions

³ Group discussion, Anlong Chrey Jan, 2018.

and the changing landscape beyond the forest. Now they bring fish (explained below), and myriad other convenience goods along the ever-improving roads.

Since 2016, this once forested landscape has almost completely transformed into cash-crop production on small to medium sized farmsteads (i.e less than 50 hectares). Of the myriad processes at this agrarian frontier, discourses of food emerge as loaded and polyvalent (Davila, 2020), describing the divergent representations of social value in this settler-colonial landscape. To explore these changes, we focus on a newly significant food that exposes elements of a semiotic rift and provides a vehicle with which to discuss the epistemic and metabolic rifts that describe the larger social landscape. Motofish, (in Khmer *trai moto*), are literally fish transported by motorbike from the market at the provincial town out to remote villages. They are physically the same fish for everyone who buys and sells them, but they represent significantly different things for the local indigenous communities and the incoming migrant settlers colonizing the landscape. Motofish are not a species of fish, rather they are any species that is produced and sold in the market, and then brought to the village by motorbike vendors. Depending on the interpreter, motofish can be a sign of social and environmental degradation or a sign of development, liberation, and progress. We suggest that this represents a semiotic rift in which an object is at the same place and time, and for the same reasons, a sign of opposing social values.

Motofish symbolize both destruction and development. But this little fish also represents the ways that capitalist production "disturbs the metabolic interaction between man (*sic*) and the earth" (Marx, 1976 p. 637), and the ways that scholarship focusing on the relationship between labor and capital paid too little attention to that relationship between humans and the earth (McMichael, 2012). Philip McMichael (2012) calls the latter an epistemic rift. By ignoring both the value and the labor of land and 'nature' across time, critical scholarship continued to reproduce a false division between human energy and earth energy. In Steung Treng, Cambodia, Marx might have been concerned with the conversion of land into property, of fish into commodities, and the subsequent generation of value in a social transition towards capitalism. This is what all the migrants, local officials, development donors, and national actors are also concerned with. The local people, whose lives were one way and are now another, are concerned with the disrupted social metabolism and the severed relationships with a no-longer-sustaining forest.

This article will discuss a semiotic rift, in which motofish signify nearly opposing social values in their consumption, one that deepened in their production; following from this we discuss the epistemic rift through which we suggest such bifurcation of social value is possible. In so doing, we will explain the ruptured environment of northeastern Prey Lang and situate it within the emerging and precarious livelihoods and social systems for both migrants and long-term residents of the area.

2. Methods and description of participants

Our assumptions are based in many collective years of research in Cambodia: Work in anthropology, and Ader in sustainable food systems (Figures 1 and 2). In making our arguments, we draw on anthropological and symbolic theories of society and food, as well as political ecology and political economy critiques of agrarian transformations and economic extractivism.

The research that revealed motofish as a bifurcated symbol of food value at the agrarian frontier started in 2017 in a project examining forest governance.⁴ At that time, interviews and group discussions were conducted in all four provinces of the Prey Lang Forest. This article emphasizes data from Steung Treng Province, where road construction is having the most impact, gathered from 11 villages in 2 communes.

⁴ Climate Change and Co-Management in Prey Lang: Social experiments in conflict transformation. Council for American Overseas Researchers/ National Endowment for the Humanities. CAROC – RA-235021.

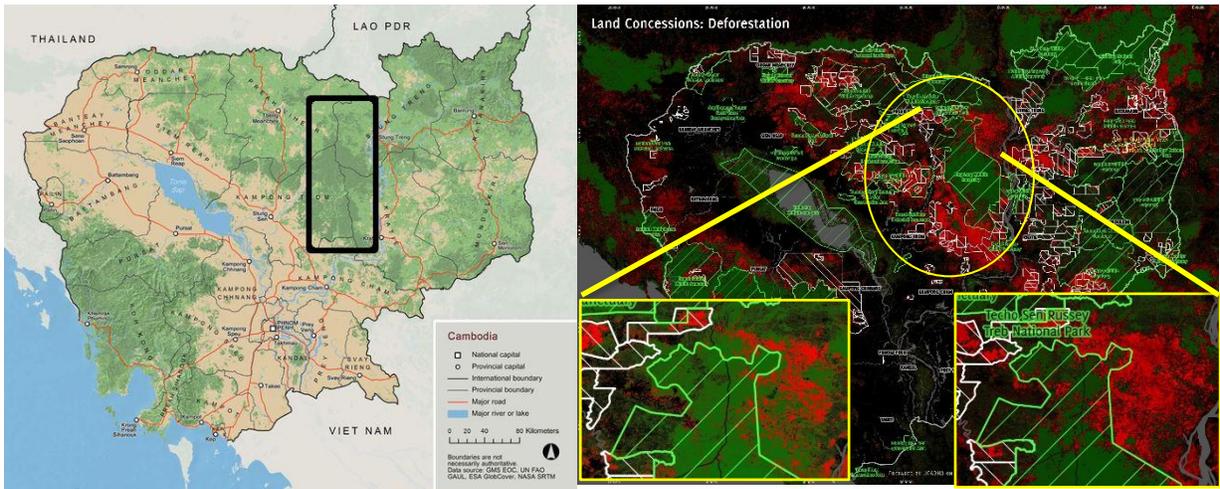


Figure 1: Prey Lang with 1989 pre-development forest cover. Study area in black square. Figure 2: Figure 2: Prey Lang on Licadho map showing 2019 deforestation in red, Economic Land Concessions in white, and Protected Areas in green. Outset- northern Prey Lang, left 2016, right 2019. Research area circled.

Most Kuy communities in the Prey Lang area recall histories that precede French interventions in the region (1863-1953), and some claim habitation since the Angkorian period (802 to 1431. See Hendrickson *et al.*, 2019). Since the post-independence years (1954-), Khmer families have also settled among the Kuy and founded villages around the edges of the forest. The Khmer and Kuy who live in and around Prey Lang share a good deal of cultural overlap (Swift & Cock, 2015), especially through Buddhist influence, the practice of hybrid systems of paddy and shifting rice cultivation, and some traditional practices, especially honoring *arak/lok ta*, the non-human guardians of the territory. Since migrations began in earnest after 2015, the Khmer families far outnumber the Kuy, and there is a growing number of Cham (Khmer Islam) migrants. There are no official statistics on the number of new families inside PLWS. In 2017 village heads reported between 50 and 120 migrant families, and the numbers continue to grow. The social landscape is changing. With the large number of Cham migrants and the pioneer nature of the incoming Khmer there is much less in the way of shared cultural practices, and social divides between locals and migrants were quite stark in the early years of in-migration, from 2015. This comes out in statements made from both sides.

In our more recent visits (2020; 2022) the animosity has lessened, but a full investigation of the emerging social dynamics in this region is yet to happen. For this preliminary discussion, we draw on a mixed method approach to data gathering conducted by the first author from 2016-2019: interviews (20 Local Kuy, 12 migrant), group discussions (15 Local Kuy, 3 migrant), 8 participatory mapping exercises, and participant observation in the 11 local Kuy indigenous villages of Prey Lang Forest in Steung Treng province. Interview data were also collected from Ministry of Environment rangers and officials in the Steung Treng Provincial Department of the Environment (PDoE) (18), the Ministry of Agriculture, Forestry and Fisheries (MAFF) (2) and researchers at the Royal University of Agriculture (2) to help elucidate the policy and governance situation of agriculture and changes to land use in the region. The second author conducted agriculture-aquaculture related interviews and, based on over seven years of field research, was instrumental in setting this data into the contemporary discourse and practice of agricultural production models in Cambodia.

In the following sections we first examine the ways that food values represent divergent conceptual social objects – development and destruction – and why we refer to this as a semiotic rift, followed by a discussion of the epistemic rift through which the bifurcation of social value is possible. We follow this with a discussion of the capitalist production that creates motofish, highlighting the epistemic and semiotic processes

that create 'trashfish', another rift-generated semiotic category. We close the article with a discussion on how the dynamic creation of symbolic representations and the contexts in which they emerge is illuminated by the metabolic and epistemic rifts. The addition of the semiotic rift to the discussion of metabolic and epistemic rifts, renders the intimate histories behind value creation visible in the context of settler colonial value transitions.

3. Peircean semiotics, in brief

Food is a powerful symbol of social values and in this section, we discuss how motofish signify two different objects of social value. To do this we harness some terminology and ideas from Charles Peirce's pragmatic theory of semiotics, which considers how "signs" are produced through interpretation and how these signs relate to objects in the work of making social meaning (Peirce, 1992). At the center of this analysis are the two social objects of destruction and development, as they relate to current land uses in the northwestern quadrant of PLWS (Figure 2). There is one sign, motofish, which generally stands for (symbolizes) development for incoming migrant families and destruction for the original Kuy and Khmer inhabitants of the region. The "generally" is important here, and we will discuss how the dynamic creation of symbolic representations points toward elements of the epistemic rift that underscores development discourses.

Signs are mediated by symbols. In our example of motofish, the word itself is a symbolic representation of an object. The object is a fish, but not just any fish. It is a specific kind of fish that is raised in a farm, (i.e., an industrial aquaculture facility), sold on the open market, and transported on motorbike over roads and trails to remote villages. Motofish as a sign is informed by all those things – fish farm, market, motorbike vendor, remote village, road – to the people who buy, sell, and eat them. As it is used among our interlocutors in Steung Treng, the term 'motofish' works at several semiotic levels. When the object is the fish, 'motofish' as a symbol works iconically and indexically, which is to say it points both qualitatively and physically to the object: the fish and its mode of transport. When motofish is a sign of destruction, or progress, it is working symbolically, drawing on conventions, habits, and social rules that connect it to its object (Peirce, 1992 p. 38). It is in this symbolic way that motofish can be a sign of both development and destruction.

The key to this symbolic entanglement of signs and objects, and the most important element of Peircean semiotics is that a sign is a representation mediated by a perceiving subject, which situates it historically (Peirce, 1998 p.273; see also Jakó, 2017). Peirce calls this the 'interpretant', and while some have suggested that this might be better understood as translation (Savan, 1988 p. 41), there is an important, almost passive element in the interpretant. Thinking, yes – but not thinking that motofish represent destruction or development. Rather, upon thinking about or invoking motofish as an object, it brings to the mind of the interpretant elements of another object, development and progress for example. Motofish conveys through the interpretant "a general concept" of development, "but not to *assert* it in any measure" (Peirce, 1998 p. 287). People were not saying, 'this fish represents the destruction of our way of life' – but rather it was the ways motofish were invoked and in what contexts that demonstrated their importance as a semiotic sign.

This down-and-dirty deployment of Peircean semiotics gives us some tools and vocabulary to talk about the kind of work that motofish does as a sign of social value through the varied ways it is deployed by different individuals in our study. Looking at what people say about this fish, in the context of their changing circumstances, we can understand motofish as more than just a fish that travels by motorbike. It is the product of political-economic and symbolic value creation, as well as a strong signifier in the social construction of knowledge, memory and possible projections for the future (Coff, 2013; Karrebaek, *et al.*, 2018). The loss of valuable rural foods is a theme emerging across Cambodia (see, Reysoo, 2023 on chickens in Kampong Thom; Eissler *et al.*, 2021 on wild plants in Battambang). Using insights from the anthropology of food, language, and semiotics, the next section discusses how the conjuncture of roads, motorbikes and fish creates a semiotic field through which to analyze agrarian transitions, as well as the dynamics of settler colonial value transitions.

4. Food, language, and the Semiotic Rift

At the symbolic level moto-fish represent almost diametrically opposed social values: Both an abundance and a lack of food, depending on who is telling the story. Indigenous Kuy say, "everything's gone.

There is no fish, no game, and now with the roads there is no forest."⁵ "Even in the rainy season, if we don't buy motofish we have no fish in the pot."⁶ In direct contrast, migrants describe their food environment as one changing toward abundance, "at first, it was just like in the forest – so hard to get good food. If we want to eat beef, we can't. Now we can! We can get whatever we want from the moto. Much easier."⁷ "With the new road, we will have motofish even in the rainy season."⁸ The ways people describe the place of motofish in their lives emerges from their individual social conventions, their habits and their conceptions of the world (Peirce, 1992, p.39).

The actors discussed here do not share the same understanding of the current situation, and this is visible in the ways they each invoke motofish to represent abundance or absence. Patrick *et al.* (2017) uses the consumption of seal meat to discuss a similar bifurcation of meaning in which indigenous actors honor the seal by eating it, and the members of Ottawa's parliament think that they honor indigenous people by eating seal. Haider *et al.* (2020) show how preserving or not preserving traditional foods articulates dynamically changing social-ecological relationships in the Pamir Mountains of Tajikistan. There is an important link here that exposes some intricate and historically entangled symbols of the good life (Appadurai, 1981). Appadurai calls this "gastropolitics" in describing Hindu food regimes where food can either bind or separate social groups. In the case we describe there was a world teeming with fresh, chemical free, edible foods to be gathered during the rainy season and hunted in the dry season that is not relevant for the migrant in the same way that it is for the local shifting cultivators. There is an ancient social value shared by both Buddhists and Muslims in which hunting and gathering are shunned in favor of agriculture and domestication. This ancient moral preference for settled grain cultivation (Collins, 1998; Scott, 2017), slides almost unnoticed into modern, secular notions (Asad, 2003), in which discourses of development adopt similar morally infused notions of appropriate land use. In the past, Buddhist elements added to agrarian rites in Cambodia's hinterlands contained admonitions for the hunter to come down from the hills and join in the peaceful Buddhist life of settled agriculture (Porée-Maspero, 1962, pp. 579-650). In the present, migrant women lament the fate of their indigenous neighbors, who have nothing to eat but *bok* (a nutrient-rich paste made from salt, chili, and local nuts/fruits/plants/meats) because they "...are still out looking for grass. They have no money to buy food from my store. They know nothing."⁹

By contrast, the local people say, "now we have all these things we can use [plastic bowls, metal roofs, motorbikes] ... but we can't find any food."¹⁰ "Sometimes we have only *bok* to eat, with no meat or vegetables."¹¹ For many local residents, it is not the lack of money that is the problem, it is the actual lack of available animals to hunt, trap, and eat. Lack is a product of history. The objects in the world, including items that serve as part of the diet, are signs of lacking depending wholly on the conventions, habits, and concepts of whomever is signifying it. This disjuncture in the conception and discourse of what is appropriate food at the agrarian frontier is a sort of "gastropolitics" (Appadurai, 1981). Local residents cannot find food because the abundant biodiversity of the forest is gone. 'We have nothing to eat, only motofish.' At the same time, there is a huff of derision from a migrant woman when asked how much of her food she gathers by herself, and a look of incredulity when asked how much of her food she buys from the market, "100% of my food comes from the vendors (*neak luak*)."¹² This same woman is happy for the road that will bring her motofish, "even in the rainy season", when rural roads can be hard to travel. Ironically, in previous years fish were abundant in the streams in the rainy season.

For migrants, moving to this area is an opportunity. "There was no land, we couldn't make any money in our home village... here, I have 10 hectares and can plant cassava in with my cashew saplings. I could never

⁵ Local male 40s, Anlong Chrey, Feb 2019.

⁶ Local male 40s, Krabie Muy, Jan 2018.

⁷ Migrant male 40s, Viel Po, Feb 2018.

⁸ Migrant female 20s, Pa'ow, Feb 2019.

⁹ Migrant female 40s, Romdeng, Dec 2019.

¹⁰ Local male 40s, Anlong Jrae, Jan 2018.

¹¹ Local female 50's, Anlong Pe, Jan 2019.

¹² Migrant female 30s, Toal, Jan 2018.

do that in Kampong Cham, there is no land for that."¹³ The undeveloped frontier, from the migrant perspective, holds the promise of a new life, especially for young families. "We were so poor, there were no jobs and no land. We had to do something... Yes, it's hard, but we are making money and the region is developing."¹⁴ The move from scarcity to abundance is articulated clearly in the migrant's stories.

It is beyond our scope to discuss the complex and violent circumstances through which migrants populate frontier areas. Those encountered in the Prey Lang region suffered land scarcity in their home provinces, find themselves in insecure land tenure situations, and are subjected to the precarity of cash-crop production (Diepart & Ngin, 2020; Mahanty, 2022). Nonetheless, by their own assessments of their lives, they moved from conditions of scarce land to abundant land and with road infrastructure development in the receiving landscape, and the increased availability of motofish, they moved from food scarcity to food security. For forest-based economies, the move from abundant forest to food scarcity is equally visible (see Figures 3 and 4 for the perceptible changes in the landscape). Kuy tell how, "migrants come to buy our land and we sell them one hectare, but they clear everything behind it. They clear in one year what would take us 10 years to clear."¹⁵ The fact of roads and increased connectivity to the market eases this transition, and regular access to motofish ensures that people are not starving as the landscape is divested of its productive resources. We expand below on the metabolic implications of this rift and the importance of capital production and infrastructure in obscuring the fissure.

The idea that roads bring food is relatively recent globally, and here at the edge of the forest it is a very new idea. Before 2013, when migrant settlement increased dramatically, "we got 100% of our food from the forest and swidden."¹⁶ Since 2013, no families were able to *meet all* their food needs from the forest, and during the years of this research (2017-2020), Kuy families reported getting 60-100% of their food from the market. As the physical landscape changes to accommodate settlers and their market crops (Figures 3 and 4), it brings with it numerous changes to the symbolic landscape for local people. Notable among these are individual and community relationships with *lok ta* and *arak*, which are powerful non-human agents, "guardians of the territory" (Work, 2019, p. 75), that mediate local access to natural resources, adjudicate social relationships, and engender a different kind of gastropolitics in which food is both physically and morally connected to the cosmos (Feuer, 2016; see also, Appaduari's discussion of Hindu conceptions of food, 1981, p. 496). Feuer argues that the homogenization of food culture can emerge as an "existential threat" to the "uniqueness of cultural identity and the sacredness of the land" (p. 98). This homogenization is apparent with industrial aquaculture focusing on few species (even creating hybrids not found in the wild (Joffre et al. 2019)), which then are reduced to 'motofish', as the specific species become irrelevant to the consumer.

Engagements with non-human agents in the landscape are often glossed as 'religion' and understood in the realm of superstition or 'animism.' This focus on religion is misguided, as close attention to the practices reveals a focus on access to resources (Work, 2019), on cultivating the social relationships necessary to ensure access (Sprengrer, 2017; Todd 2014), and on "keeping the awareness of the wider world constantly at the forefront of attention" (Howell, 2016, p.55). Local humans behave in particular ways¹⁷ ensuring good relations with the powerful non-humans, which in turn ensures consistent access to resources and continued good health. Social relationships with elemental forces, access to natural resources, and good health are all entangled in people's new dependence on motofish. The lack and the loss, therefore, is deeper than just fish and game, the loss of the forest also entails the loss of protection and the loss of health. This is explicit in the ways that people talk about their current situation, we offer three examples:

¹³ Migrant male 30s, Viel Po, December 2019.

¹⁴ Migrant female 40s, Pa'ov, January 2018.

¹⁵ Local group discussion, Anlong Pe, Jan 2018.

¹⁶ Local group discussion, Morn, Jan 2018.

¹⁷ Annual rituals, respectful modes of comportment in the forest, and in the village, asking before taking- especially land, trees, and large game, taking only what you ask for... Signe Howell refers to these as "cosmo rules" (2016).

In the 1980s we had the forest and *lok ta*. Then the companies [forest concession companies] came and didn't *sien lok ta* [to offer tokens of respect]. Now we can't find any food. We look and only find *domlong* [a forest tuber in the cassava family].¹⁸

I had 13 children and was healthy all the time. I climbed this mountain up and down in the morning looking for food. My children have only 2 children and are sick all the time. There are so many new diseases now, malaria, dengue, stomach problems... Before, the rain and the trees had a good relationship, now the rain is all wrong and the food is full of chemicals.¹⁹

We have to ask *lok ta* for land – migrants don't do this. They ask the Kuy, but not *lok ta*. Sometimes migrants buy from Kuy and then cut more – they never ask *lok ta* and when the village goes to *larng lok ta* [annual celebration], migrants never join. Now there are no animals here.²⁰

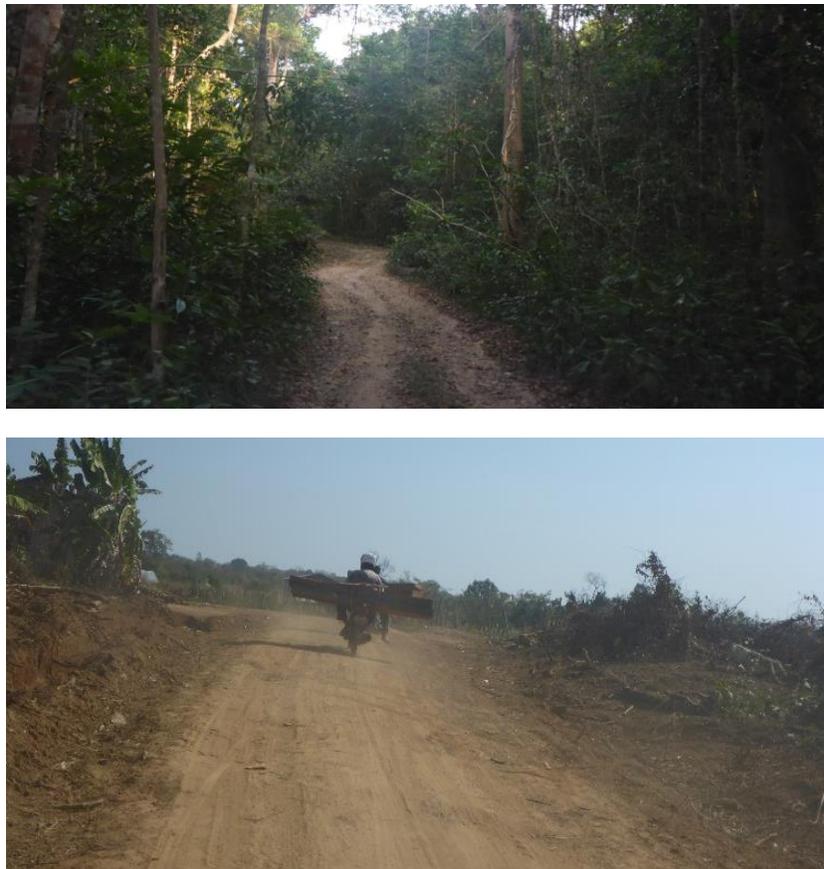


Figure 3: Road development in Steung Treng. Above is 2017; Below is 2018. Same road between Anlong Chrey and Pa'ow. Images by Author 1.

¹⁸ Local group discussion, Anlong Chrey, Jan 2018.

¹⁹ Local female 50s, Toal, Jan 2018.

²⁰ Local male 50s, Morn, Jan 2018.



Figure 4: Anlong Chrey village, Jan 2018. Above facing northeast toward the provincial center; below, southwest toward the forest. Same day; same time. Image by Sen Sothea

In the final quote, note how migrants not joining in the annual celebration for the land and the disappearance of animals emerge in conjoined sentences, signaling their connection in the mind of the male respondent. The way people talk about relationships with *arak/lok ta* is in the register of food acquisition and resource/land distribution. Karrebaek, *et al.* (2018) suggest that such language embeds in both "moral

colorings" (p. 19) and in transformations of meaning (p. 23). In Cambodia, there is a large social place in between the ancient value of settled cultivation and the ancient stricture against hunting. Many wet-rice growing Khmer share practices connected to *lok ta* (Swift & Cock, 2015; Work, 2020), and rice production in the Buddhist context in Cambodia and much of Southeast Asia involves various rituals for binding the agentive wild grain to ensure consistent harvests (Davis, 2016). It is widely acknowledged that the Islamic Cham have no relationship with *lok ta*, but even among Khmer migrants into Prey Lang, these practices seem to be muted or absent altogether: "They don't follow us when we *sien lok ta*, and they say we are backward."²¹ There is more to investigate here amid changing political and economic relations (see Resyoo, 2023). Contemporary market economies seem to deaden the products of the land, and among the Kuy there is no need for annual ceremonies for the cashew like there is for rice, further dulling the relationship to the land (see also Sprenger, 2018 on coffee).

The extent to which national Buddhism is playing a role in this process is suggestive. Transformations of meaning in the Buddhist context during different political and economic eras are common (see, Hansen, 2007; Picard, 2017) and there has been a proliferation of Buddhist temples across the Prey Lang landscape in recent years. These are connected explicitly to migrants: "we came and started to build the *pagoda* [Buddhist temple] and [now] have monks and *ajar* [learned elders]"²² and development. "This temple was destroyed during Pol Pot, before we had no money to repair it... since development started, we can grow cassava and have money."²³ This speaks again to notions of deficiencies and abundance, and entangles local actors with the incoming practices of migrant settlers, both of whom seem to be building, growing, and ignoring the missing forests across the region. "What could we do? We can't do shifting cultivation if the neighbors are doing plantations."²⁴

For locals, this is a bifurcated forgetting, and under the stories of money and development the missing forest, its cosmopolitical significance, and their powerlessness are still significant. "We can't stop them. They come and they have permission from the authorities. They cut our sacred forest...."²⁵ Up until the year 2000, people shared food and built huts of grass, but through the work of constant repair, the influx of migrants, and the pressure from authorities to 'develop', "then we started having desire."²⁶ There is a tangled knot of desire for development, external pressures, and the convenience of the market: "in the dry season, we don't have to go far looking for food. They bring it right to our door!"²⁷ But beneath the reported convenience, is also the loss of ease, "Swidden was easier. We would just have enough for our food, then have free time for cooking, fish traps, making roofs and walls for houses. Doing plantation is hard, we work all the time."²⁸

Working all the time, having to value money relationships over sharing, losing access to all but one food source, losing elemental (land and water-based) social relationships of protection and provision, facing food scarcity and ill health, all these memories are caught up and connected to motofish. This semiotic sign entangles memories of abundance, even as it suggests a future of convenience and progress in which plastic-wrapped food in modern markets replaces the value of wild fruit and greens (Pingali, 2007). There are no memories of loss for migrant communities, who see their food connected to the land, but through the more limited lens of rice, kitchen gardens, fruit trees, and cash to buy food. Losing forest does not mean losing food for lowland rice growers in the same way. The split between the forest and the village in Khmer imaginary has been well explored (Hansen & Ledgerwood, 2008), and the ways that division articulates the land and market transformations of both the ancient and modern states are significant (Work, 2020). Today, migrants reproduce forms of knowing about food that is influenced by generations of imperial food values that do not take the forest into consideration. Forest loss is not related to food loss, but to the taming of the wild, the uncivilized

²¹ Local group discussion, Anlong Pe, Jan 2018.

²² Migrant female 40s, Romdeng, Dec 2019.

²³ Local group discussion, Anlong Chrey, Jan 2019.

²⁴ Local male 50s, Morn, Jan 2018.

²⁵ Local male 50s, Toal, Jan 2018.

²⁶ Local group discussion, Toal, Jan 2018.

²⁷ Local female 50s, Morn, Feb 2018.

²⁸ Local female 30s, Anlong Chrey, Feb 10, 2019.

and the dangerous. This is an epistemic rift (Schneider & McMichael, 2010; McMichael, 2012), which we take up in the following section.

5. The Epistemic Rift

At the agrarian frontier of Prey Lang, the way of life is transitioning from market-independent social systems based in subsistence, to market-oriented systems based in the production of non-subsistence crops, like cashew (or cassava, mango, rubber etc.) and the accumulation of capital.²⁹ This transition is still hailed in many forums as development and progress (ADB, 2019; World Bank, 2017). But even in the early stages of capitalist agriculture, Marx recognized the disruption of the "metabolic interaction between man and the earth" (1976, p. 637). This has since been described as a "metabolic rift" (Foster, 2000, p. 163), which Marx located in the separation of people, especially their waste, from the metabolic cycles of the land. There is a rift in the metabolism of both industrialized and self-organizing organic systems under capitalist modes of production. The metabolic rift that results when people are removed from the land is, however, inadequate to describe the ruptured relations between human and ecological labor that we describe when the forest is removed from the people. An entire system of knowledge and relatedness disappears and is replaced by something less resilient, less nourishing, and insufficient for maintaining social relationships (Woodley, 1991; Dove & Kammen, 1997).

There is an impact when a metabolic rift occurs, when forest is removed from the humans, but more powerful in the long term is the *epistemic* rift that emerges out of the human-centered production of knowledge about capitalism, modernity, and industrial production, developed from Marx's insights (Schneider & McMichael 2010). Schneider and McMichael suggest this epistemic rift describes a bifurcation of value as whole systems of knowledge about agro-ecological contexts and the practices within them disappear in capitalist frameworks of production. This is a "knowledge rift" that accompanies the very real metabolic rift described by Marx (Schneider & McMichael 2010, p. 476). People migrated away to cities and took with them their nutrients *and* their intimate relationships with particular ecosystems and their knowledge of techniques and practices of how to survive within unique local contexts (including *sien lok ta*). However, in the context of Prey Lang, it was the forest, not the people that left.

Motofish now emerges from capitalist production, and 'comes right to our door.' McMichael suggests that "capitalist value relations claim ontological priority" (2012, p. 148). As market relations become normal relations, fish farmed in industrial farms and delivered to the village as motofish are part of the everyday and habitual experiences through which people interpret social value. This creates a rift on the other side of which are chemical-free fish caught fresh from the stream using hand-crafted technologies. This basic understanding of agroecosystems is removed, and hardly noticed (Cetinkaya, 2009).

For example, the everyday act of going out to catch fish is dependent on so many things that involve a constant awareness of a person's surroundings and of the interrelationships between the various elements. Knowledge—of the fish, their habits, seasons, and desires—is only one part of the general entanglement that Moore (2017a) invokes. It also involves knowledge of the raw materials needed to make the tools to catch fish, their habits, seasons, and desires. It involves communal activities of gathering materials for and fashioning these tools, the constant transformation of collective fishing knowledge, and is tied up with the social relationships with *arak/lok ta*. Both the fish and the people belong to *lok ta*, and the ability of a fisher to find fish is part of a whole system of awareness and attention to the myriad processes of the world. Connectivity is value, and people are connected to the world through their attention (Sprenger, 2017; Howell, 2017). Motofish, and all the things that have accompanied its rise as the primary food source today for long-term residents of the forest, changes the kind of connectivity needed for effective survival. It also changes the ways that people are expected and allowed to interact with the living environment.

The practices of shifting cultivation are not only easier than plantation agriculture, as claimed by the woman above (see also Sahllins, 1972), they form part of an entire ritual cycle that entangles food with human and non-human persons and the energies of the soil (Cramb *et al.*, 2009; Dressler & Pulhin, 2010; Keating,

²⁹ By market-independent we do not mean market isolated. Rather that market relations were a choice, an add-on to general subsistence that could buy certain luxury items like blades or ploughs.

2013). Working in and with the forest, which is governed by *arak/lok ta*, requires a particular kind of comportment that people talk about in the registers of both fear and care. "If I'm not careful, *lok ta* will do something bad to me" (*tver bab*).³⁰ The care includes things like respecting the other animals (especially insects), asking permissions, and not cursing, swearing, or getting angry in the forest. The sentiment behind that last one is a form of humility, taking what comes without a fuss. The fear is of illness, accident, and deficiency.

People reported abundant lifestyles across this region until the early 2000s, and fully sufficient resources up until 2012. They relied on the forest for food and supplies through intimate knowledge of its rhythms and relationships. "Before that [2012] there wasn't anyone that came to grab land – no one would dare. We were here, doing shifting agriculture... At first the people who came were small and poor just like us. Bought land for a few hundred dollars per hectare."³¹ People say they sold the land because they wanted the money. At first it was no big deal, they felt like there was plenty of land. Then later, migrants would buy one hectare and clear ten. After that, when locals would not sell, people started grabbing land "so then, we would just sell. Better to get the money if we lose the forest anyway."³² Now people report that land in the villages at the forest periphery sells for US\$10,000 per hectare.

The epistemic rift then includes the loss of practical subsistence knowledge and local understandings of agroecosystems, as the forests along with whole ecosystems and the values that support them in human practice disappear (Schneider & McMichael, 2010). Without the forest, knowledge of how life once was is more difficult to reproduce. Capitalist expansion in Cambodia and its accompanying deforestation and development changes the local ecology and also the ways of knowing how to engage in this local agroecosystem. Without the forest the transformation is dramatic, swift, and sure, and the market option of motofish becomes inevitable.

Moore extends the scope of this epistemic rift to include not only the local knowledge of production that is lost as people are separated from nature, but also the reproduction of the concept of society as separate from nature, creating two "epistemic domains" (Moore, 2017a, p. 293), namely 'Society' and 'Nature.' This separation contains a "series of violent abstractions" (ibid.) that shapes the way the world is interpreted by perceiving subjects. It goes on to shape politics and policy, including development initiatives and discourse (Diaz *et al.*, 2018). The separation of nature from society is "hardly value-neutral", and Moore points to how the categories "embody arbitrary yet patterned relations of power" (ibid.), that have "reproduced 'real world' systems of domination, exploitation and appropriation" (2017b, p. 601).

6. Making Motofish and the Metabolic Rift

We can see this process playing out in real time in Steung Treng. This section draws together the semiotic and epistemic rifts that bring motofish into being as a sign of both development and destruction, illuminating the multiple metabolic rifts through which the fish is materialized at the resource frontier. The influx of settlers, who carry both epistemic and semiotic elements, drives the metabolic transformation of the supporting landscape. Settler presence is made possible through road development that was instigated by early timber companies in a post-socialist market environment that has expanded through development corridors and global trade deals (Le Billon 2000; Hurtle, 2007; ADB, 2019; Dickinson, 2022a). Motofish emerge through aquaculture, as part of the market solution that ensures people continue to have access to food in the process of metabolic changes to the physical landscape (Satizábal & Dressler, 2019; Richardson & Suvedi, 2018; see Figure 4 for visuals of the metabolic changes). Aquaculture is understood to be vital for "maintaining fish supply over the coming years" (MAFF, 2015 p. 6), in the face of a river system stressed from overfishing and habitat degradation caused by human population growth, economic development, and environmental changes in the river flows and in the climate at large (Mahood *et al.*, 2020; MRC, 2021). The need for farm-produced fish also increases pressure on the river's metabolism, as small and juvenile river fish (called trashfish) are used for feed, depleting future adult fish stocks as well as food for larger river fish (Belton & Thilsted, 2014;

³⁰ Local male 30s, Anlong Chrey, Feb. 2019.

³¹ Local female 60s, Morn, Jan 2019.

³² Local male 40s, Anlong Pe, Jan 2018.

Edwards *et al.*, 2004; Healy & Nom, 2017; Ros, 2019). Behind these structural forces transforming the metabolic infrastructures that spontaneously produce food, lies the value episteme of settler colonial patterns that slide seamlessly into the idea that fish farms are a replacement for and of equal value to self-producing fish in a healthy river (McMichael, 2012; Nunoo *et al.*, 2009; Wolfe, 2006). But according to Kuy villagers, motofish are not fish to be classified and known. They may have a species classification coming from the scientists that breed them, but they are known only as 'motofish' for the long-term residents of the forest. Motofish have no history or social relations for local residents, they come from outside, entangle only monetary relations, and signify severance from the forest's economy (Todd, 2014).

The rich forests of Cambodia's post-communist transition were highly valued by subsistence cultivators, warring factions, as well as the global elite, whose appetite for rosewood, teak, and beng hardwoods had already decimated the Asian forests where communism was defeated (Le Billon, 2000; Thun, 2010; Guan 2013). The story of licit, then illicit trade in luxury timber in Cambodia provocatively mirrors the story told of the demise of sturgeon fish from the Caspian sea in the post-socialist era (Dickinson, 2022b). Both the timber and the sturgeon hit the market in an era of rising wealth and rising opportunities for its display, and both had been previously protected from consumption by centralized and isolated socialist markets (Cock, 2016; Dickinson 2022a). Luxury timber species in Cambodia are nearly wiped out in Cambodia, as are Russian sturgeon, whose caviar glutted the market. Cambodia's timber market was just the first step in what has become a massive metabolic transformation (GW, 2015; GI, 2021; Work *et al.*, 2022). The timber market brought the first companies, the first roads, and a large wave of early migrants into the deep forest (Le Billon, 1999; Swift, 2013). When the wars finally stopped, plantation agriculture through Economic Land Concessions (ELC) began. The development community claims there is a need to increase the production of agricultural systems to improve human nutrition and agricultural resiliency.³³ This an epistemic fact that ignores the highly diverse and nutrient rich diets of forest dwellers while promoting the production of market crops.

These market crops are primarily rubber, sugar cane, and cassava, all of which attract smallholder cultivators that move into forests adjacent to large ELC, who open the forest and break roads while creating new commodity streams (see, Mahanty, 2016; 2022, on cassava). In Steung Treng, cassava is coupled with cashew production, which is dominated by small holders at the resource frontiers, many of whom are Indigenous and former shifting cultivators (Padwe, 2011). Cashews are a major new commodity in SEA and in Cambodia For example, in 2018 the government of Cambodia signed an MOU with the Vietnam Cashew Association in order to increase the export of cashews from Cambodia to Vietnam (Vannak, 2018). In the same year the Switzerland-backed NGO, Heks/Eper, launched a US\$7.8 million development project for cashew nuts in Cambodia with the explicit intent to "improve the livelihood of rural families" by increasing "food security, income, and land management" for the poor rural communities in Steung Treng (Ann, 2020). This explicit coupling of cash income with food security is a subtle semiotic invention that obscures the metabolic rift created when cash income from market crops destabilizes the planet's spontaneous food production system.

Projects like The United States' Feed the Future program³⁴ protect the forest by promoting new market-based, as opposed to forest-dependent, livelihood systems.³⁵ Part of these market-based systems are cultivated fish production to increase trade and food security.³⁶ The growing effectiveness of aquaculture worldwide does increase the availability of fish in the market. Salmon for example, transformed from an elite luxury food into a cheap commodity available at every fish stand (Coates, 2006). Cambodia's Tonle Sap lake, one of the richest fresh-water fishery in the world (Lamberts, 2006) is now filled with "freshwater cages" growing catfish for sale in the local markets (Ros, 2021 p. 15). The salmon and the catfish share an important historical transformation. King salmon was revered as a "heroic symbol of unfettered freedom" by western anglers (Coates, 2006 p. 10) and honored with ceremonies and sacrifices among salmon-eating people across the world

³³ Whole departments at universities are devoted to this mission, see for example the USAID funded 'Feed the Future Fish Innovation Lab' program at Mississippi State University. <https://www.fishinnovationlab.msstate.edu/research/projects>.

³⁴ <https://www.feedthefuture.gov/>

³⁵ See Greening Prey Lang <https://www.tetrattech.com/en/projects/usaid-greening-prey-lang-cambodia> and <https://www.phnompenhpost.com/national/prey-lang-forest-promoted>

³⁶ <https://www.cesain.org/project/commercialization-of-aquaculture-for-sustainable-trade/>

(p. 150- 55). Salmon is an awe-inspiring fish whose reproductive success requires strength and stamina unmatched by others. The Mekong giant catfish also inspires reverence, and is honored by Southeast Asian fishers as an ancestor that influences their health and their fishing success (Johnson, 2020). The giant catfish grows quickly and to great proportions, up to four-hundred pounds in six years, after which they can live for over sixty years, traveling hundreds of kilometers up the Mekong as part of their annual migrations (Hogan *et al.*, 2004). Kuy collaborators in Kratie province along the Mekong report that a full-sized catfish would feed an entire village, "before, we would share, now we sell the big fish and just buy motofish for ourselves."³⁷

Farm-raised catfish and salmon are now widely available, inexpensive, and conveniently produced in family-sized portions. Their wild, giant kin are nearly extinct, and no longer part of the riverine system for spontaneous food production (Coates, 2006; Hogan *et al.*, 2004). In Cambodia, the production of these single-family-sized catfish creates another metabolic rift in the river. The catfish raised in freshwater cages in the Mekong River and the Tonle Sap Lake are fed 'trashfish' from those same water sources (Healy & Nom, 2017, p. 86). Trashfish are small and juvenile fish that are caught (often illegally) using mosquito nets. From 2 to 5 million tons of "trashfish" are taken out of the natural water sources each year to feed cultured fish (*ibid.*). As a social category, trashfish have profound semiotic, epistemic, and metabolic implications. Subsistence fishers keep some of the small and juvenile fish from their nets to pickle for the dry months. They are not prized or praised, but valued nonetheless as *prohouk*—a homemade cooking staple.

In order for this supply of mature river fish, small feeder fish, and *prohouk* to be labeled trashfish, a "series of violent abstractions" have occurred that gut the metabolic infrastructure of the river (Moore, 2017a, p. 293; Belton & Thilsted, 2014). Not does the fact of trashfish as a social category decimate present and future spontaneous fish populations, it also provides an avenue through which American soybean growers promote "sustainable fisheries contributing to ensure people's food security and socio-economic development" by selling growers fish food pellets (Healy & Nom, 2017, p. 88; MAFF 2015). The natural fish species pushed toward extinction by the impacts of hydroelectric dams, overfishing, habitat destruction, river traffic, and toxins can now be cultivated using industrial techniques that include soybean-based feed. These 'alternative' feeds reduce the impact of 'trashfish' harvesting on the river system (Belton & Thilsted, 2014; Edwards *et al.*, 2004; Nunoo *et al.*, 2009), but ignore the metabolic rifts created by the American soybean industry and the industrial global food regime (McMichael 2009).

The global food system is implicated by the appearance of motofish as a semiotic rift in the denuded Prey Lang Forest. The fish, dismissively named by its mode of transport by former forest residents who honored and named its wild cousins, signifies the metabolic rift that brought it into being. Motofish also signifies the epistemic rift through which generations of Cambodian peasants have come to see market-independence as backwards, and the convenient provision of farm-raised foods with all their attendant chemicals as civilized. The appearance of the semiotic rift of motofish marks the moment when forest-literate Kuy and Khmer people will give way to the next generation raised on motofish. We do not know, but will watch, how long the negative connotation of motofish persists among those who identify as Kuy. To what extent their forest-literacy will continue in the absence of the forest is unknown. Already people feel the effects of losing their healthy swidden diets and also the convenience of the cash generated by their cashew farms. Motofish need to be cultivated to feed the growing populations growing cashews where the forest and fish used to be (Dove, 1983; Worldfish 2019). And, motofish eat trashfish, ensuring the scarcity of socially entangled fish.

7. Discussion

There is a rift at the heart of agrarian transformations across the world. This rift is not new to the long-term residents of Prey Lang, but they have only recently been confronted by its 'real world' implications. The focus and discourse of the development community on particular types of infrastructures and opportunities, especially markets, roads, consumer goods, doctors, and schools all do bring good things. But their previous mode of existence is still part of living memory and there is both incredulity and ambivalence in the face of

³⁷ Local Male, Beung Chas, Kratie, Feb. 2018.

the rift. The narrative pattern in each of our selections speaks to the rifts that long-term residents are trying to articulate. Here are some of the things they say:

Before we could solve our problems together... our life was really happy, but we were so far from the market... We are happy to make money and have the market, but we don't have solidarity... there is much more suffering... we have all these things we can use, but no natural resources (*teun tien tommajiet*)... we can't find any food.³⁸

The migrants are really affecting our lives. There is nothing good right now. No forest, everything is unstable. Our health is so bad... The last two years have been so hot. The Siembok river [a large year-long river] is dry. The people who have money in the village just clear land. If they have money, they clear.³⁹

"The roads make it easier to cut the forest.⁴⁰ The dust [from the new road] is also a problem – we are sick all the time, everyone has lung problems, and the children are coughing." This woman's husband added, "We have no idea what this development will mean. But we want it. It's a good thing."⁴¹

The fact that 'the children are coughing', but 'this development is a good thing' brings us to a key element in these rifts. Subjects infuse signs with meaning based on their experiences, habits, thoughts, and norms, and none of these things are static or free from alteration, direction, and influence. The facts of forest loss and motofish are elemental changes to the experiential environment of interpreting subjects. The revaluation of land, the migrants derisive of autochthonous residents, and the authorities with their disrespect, laws, and impunity, these are all implicated in the missing forest of which motofish is a sign. This fish created out of the logics of capitalist production is an offense to local residents accustomed to fresh fish, freely available through the dynamic interaction between the ecological network and their specialized knowledge. At precisely the same time, the same fish is a blessing for forest-illiterate migrant families, derisive of hand-made fish-capture technologies. Further, fish and game scarcity in the region is directly related to market forces and over-extraction, combined with degradation from industrial production that now includes the production of motofish. Extractivism morphed from the multiple disconnected nodes of value creation through mining, timber, and cash crops, and is now delivering cultured fish and other luxuries into the once-fertile landscape.

This is a contact zone where the market-independent, forest-literate Kuy and Khmer population encounters the colonized and fully assimilated Cambodian peasant in the context of a massive metabolic rift. The profundity of the landscape transformation is obscured, however, by the rapid pace of capitalist expansion, road development, and food provision, all of which devalue free food produced by the planet and the skills necessary to procure it. This is not just a question of knowledge, value, and desire. As the food situation changes in Prey Lang, people contend with the 'gastropolitics' of a new symbolic world in which their food is impoverished, but they are modern and rich, with money to buy things. This goes against studies that posit a lack of income driving abject poverty and malnutrition (see for example, Vilian & Baran 2016). What our study suggests is that malnutrition emerges out of severed social and epistemological relationships with the forest and with wild foods. Nonetheless, there are elements of desire that direct local Kuy people toward the convenience of capitalism, which holds important status markers associated with participation in the dominant culture that say explicitly 'not slave', and 'not savage.' The epistemic rift through which market independence and forest literacy become savage is one through which the breathing labor of the entire life-producing system is abstracted from human sociality, producing both motofish and trashfish.

³⁸ Different local voices from a Kuy group discussion, Anlong Chrey, January 20, 2018.

³⁹ Male Kuy village head, 50s, Anlong Pe, Feb 2019.

⁴⁰ The road-accessible villages in the region have gained 50-120 new families since 2015.

⁴¹ Local homeowners 60s, Anlong Pe, Feb 11, 2018.

The seeming inevitability of capitalist transformation emerges out of the radical re-configuration of space that makes one episteme useless and another indispensable. Moore suggests that capitalism is an "ontological formation" and that the 'violent' abstraction of humanity from nature is part of its world-ecology (2017b, p. 601). What we draw out here is the ways that the metabolic rift is instigated not through the abstraction of humanity from nature, but rather from *the removal of the forest* from human proximity. This removal in the service of monoculture production (cashews), and also serviced by monoculture production (motofish), is the foundation upon which new practices and alternative epistemologies take root. Of course, this is not a static design, but a thing constantly in motion, and new habits will be configured around motofish as the primary source of sustenance. Connectivity to the market, as opposed to connectivity to lok ta and the forest, is coming more and more to define what it means to be a person, and consequently, what will ensure survival.

As an expression of relatedness, motofish is a sign of what the Kuy have lost. "We used to share everything. A big fish is too big for one family to eat."⁴² Motofish are small, single-family fish, with chemicals, that come to your door every day, cheap. The meaning doesn't come out of the fish. It is a product of the socially and materially embedded mind of the interpretant. The same object, then can have different meanings and the multiplicity of fish can shrink to one. It is only motofish, regardless of its individual species. "If there were no motofish, there would be no fish in our pot", says the local Kuy farmer quoted above. And what of the fish? Neither motofish nor trashfish signify fish species, they are fish categories. Motofish is a symbolic representation of two opposing social values invoked by people with different ideas of value. It fully represents the metabolic rift, showing the destabilization of ecological and social metabolism, it exposes the epistemic rift through which that disruption is legitimized and naturalized, and it illuminates the semiotic rifts that occur at the agrarian frontier smoothing over a violent and maladaptive transition.

References

- Ann. (2020). Cambodia's cashew nut exports nearly double in 2019. *The Star*. Tuesday, January 14th, 2020. Phnom Penh. <https://www.thestar.com.my/news/regional/2020/01/14/cambodia039s-cashew-nut-exports-nearly-double-in-2019>
- Appadurai, A. (1981). gastro-politics in Hindu South Asia. *American Ethnologist*, 8(3), 494-511. <https://doi.org/10.1525/ae.1981.8.3.02a00050>
- Asad, T. (2003). *Formations of the secular: Christianity, Islam, modernity*. Stanford University Press.
- A.T., Aruna Technology (2009). *Rapid assessment of Prey Lang Forest*. East-West Management Center.
- ADB, Asian Development Bank (2019). *Development Effectiveness Brief: Cambodia and Asian Development Bank-partnership for inclusive growth*. Asian Development Bank. <https://dx.doi.org/10.22617/BRF199900>
- Baird, I. (2023). From "Slaves" to Indigenous Peoples: Shifting identities in Northeastern Cambodia. In J. J. P. Wouters & M. T. Heneise (Eds.), *Routledge Handbook of Highland Asia* (pp. 391–402). Routledge.
- Belton, B., & Thilsted, S. H. (2014). Fisheries in transition: Food and nutrition security implications for the global South. *Global Food Security*, 3(1), 59-66. <https://doi.org/10.1016/j.gfs.2013.10.001>
- Campbell, H., & Dixon, J. (2009). Introduction to the special symposium: Reflecting on twenty years of the food regimes approach in agri-food studies. *Agriculture and Human Values*, 26(4), 261. <https://doi.org/10.1007/s10460-009-9224-7>
- Cetinkaya, G. (2009). [Challenges for the maintenance of traditional knowledge in the Satoyama and Satoumi ecosystems, Noto Peninsula, Japan](#). *Human Ecology Review*, 27-40.
- Charles, C. V., Dewey, C. E., Daniell, W. E., & Summerlee, A. J. (2011). Iron-deficiency anaemia in rural Cambodia: Community trial of a novel iron supplementation technique. *European Journal of Public Health*, 21(1), 43-48. <http://doi.org/10.1093/eurpub/ckp237>

⁴² Local male 40s, Viel Po, Jan 2018

- Coff, C. (2013). A semiotic approach to food and ethics in everyday life. *Journal of Agricultural and Environmental Ethics*, 26(4), 813-825. <http://doi.org/10.1007/s10806-012-9409-8>
- Collins, S. (1998). *Nirvana and other Buddhist felicities*. Cambridge University Press.
- Cramb, R. A., Colfer, C. J. P., Dressler, W. H., Laungaramsri, P., Le, Q. T., Mulyoutami, E., & Wadley, R. L. (2009). Swidden transformations and rural livelihoods in Southeast Asia. *Human Ecology*, 37(3), 323-346. <https://doi.org/10.1007/s10745-009-9241-6>
- Davila, F. (2020). Human ecology and food discourses in a smallholder agricultural system in Leyte, The Philippines. *Agriculture and Human Values*, 37(3), 719-741. <https://doi.org/10.1007/s10460-019-10007-6>
- Davis, E. W. (2016). *Deathpower: Buddhism's ritual imagination in Cambodia*. Columbia University Press.
- Díaz, S., Pascual, U., Stenseke, M., Martín-López, B., Watson, R. T., Molnár, Z., ... & Shirayama, Y. (2018). Assessing nature's contributions to people. *Science*, 359(6373), 270-272. <https://doi.org/10.1126/science.aap8826>
- Dickinson, H. (2022a). Caviar matter(s): The material politics of the European caviar grey market. *Political Geography*, 99. <https://doi.org/10.1016/j.polgeo.2022.102737>
- Dickinson, H. (2022b). Navigating Sturgeon futures at the nexus of extinction and commodification. *Environment and History* 28(4), pp. 532–538. <https://doi.org/10.3197/096734022X16627150607961>
- Dove, M. R. (1983). Theories of swidden agriculture, and the political economy of ignorance. *Agroforestry Systems*, 1(2), 85-99. <https://doi.org/10.1007/BF00596351>
- Dove, M. R., & Kammen, D. M. (1997). The epistemology of sustainable resource use: Managing forest products, swiddens, and high-yielding variety crops. *Human Organization*, 56(1), 91–101. <https://doi.org/10.17730/humo.56.1.1784408q35174516>
- Dragojlovic, N., Michaux, K. D., Moumin, N. A., Li, K. H., Talukder, Z., Hou, K. & Lynd, L. D. (2020). Economic evaluation of an enhanced homestead food production intervention for undernutrition in women and children in rural Cambodia. *Global Food Security*, 24, <https://doi.org/10.1016/j.gfs.2019.100335>
- Dressler, W. H. & Pulhin, J. (2010). The shifting ground of swidden agriculture on Palawan Island, the Philippines. *Agriculture and Human Values*, 27(4), 445-459. <https://doi.org/10.1007/s10460-009-9239-0>
- Edwards, P., Tuan, L. A., & Allan, G. L. (2004). *A survey of marine trash fish and fish meal as aquaculture feed ingredients in Vietnam* (Report 437-2016-33834). Australian Centre for International Agricultural Research.
- Eissler, S., Ader, D., Huot, S., Brown, S., Bates, R., & Gill, T. (2021). Wild gardening as a sustainable intensification strategy in northwest Cambodian smallholder systems. *Journal of Agriculture, Food Systems, and Community Development*, 10(3), 1-20. <https://doi.org/10.5304/jafscd.2021.103.006>
- Feuer, H. N. (2016). Our Land of Milk and Honey: Spirituality in the transformation of ecological and heritage production. In S. Anthony & E. M. Schmidt (Eds.), *Beyond the superficial: Making sense of food in a globalized world*. Inter-Disciplinary Press. pp. 97–110.
- Foster, J. B. (2000). *Marx's ecology: Materialism and nature*. NYU Press.
- GI, Global Initiative. (2021). *Forest crimes in Cambodia: Rings of illegality in Prey Lang Wildlife Sanctuary*. Global Initiative Against Transnational Organized Crime.
- GW, Global Witness (2015). *The cost of luxury*. Global Witness.
- Haider, L. J., Boonstra, W. J., Akobirshoeva, A., & Schlüter, M. (2020). Effects of development interventions on biocultural diversity: A case study from the Pamir Mountains. *Agriculture and Human Values*, 37(3), 683-697. <https://doi.org/10.1007/s10460-019-10005-8>
- Hak, S., McAndrew, J., & Neef, A. (2018). Impact of government policies and corporate land grabs on Indigenous people's access to common lands and livelihood resilience in Northeast Cambodia. *Land*, 7(4), 122. <https://doi.org/10.3390/land7040122>

- Hall, D. (2012). Rethinking primitive accumulation: Theoretical tensions and rural Southeast Asian complexities. *Antipode*, 44(4), 1188-1208. <https://doi.org/10.1111/j.1467-8330.2011.00978.x>
- Hansen, A. R. (2007). *How to Behave: Buddhism and modernity in Colonial Cambodia, 1860-1930*. University of Hawai'i Press.
- Hansen, A. R., & Ledgerwood, J. (2008). *At the Edge of the Forest: Essays on Cambodia, history, and narrative in honor of David Chandler*. Southeast Asia Program, Cornell University.
- Healy, T., & Nom, S. (2017). *Final Report Strategic Environmental Assessment (SEA): Consultancy for Fisheries (SPF) 2010-2024 in Cambodia*. Particp.
- Hendrickson, M., Leroy, S., Castillo, C., Hua, Q., Vega, E., & Phon, K. (2019). Forging empire: Angkorian iron smelting, community and ritual practice at Tonle Bak. *Antiquity*, 93(372), 1586–1606. <https://doi.org/10.15184/aqy.2019.174>
- Hogan, Z. S., Moyle, P. B., May, B., Zanden, M. J. V., & Baird, I. G. (2004). [The Imperiled Giants of the Mekong: Ecologists struggle to understand—and protect—Southeast Asia's large migratory catfish](#). *American Scientist*, 92(3), 228–237.
- Hortle, K. 2007. Consumption and the yield of fish and other aquatic animals from the Lower Mekong Basin. [MRC Technical Paper No.16](#), Mekong River Commission.
- Howell, S. (2016). Seeing and Knowing: Metamorphosis and the fragility of species in Chewong animistic ontology. In K. Århem & G. Sprenger (Eds.), *Animism in Southeast Asia*. (pp. 55–72). Routledge.
- Jakó, J. (2017). Peirce's Interpretant. *Transactions of the Charles S. Peirce Society*, 26(1), 17–62.
- Jiao, X., Smith-Hall, C., & Theilade, I. (2015). Rural household incomes and land grabbing in Cambodia. *Land Use Policy*, 48, 317–328. <https://doi.org/10.1016/j.landusepol.2015.06.008>
- Joffre O. M, Pant, J., Somony, T., Chantrea, B. & Viseth, H. (2019). Transforming aquaculture in Cambodia through introduction of improved *Tilapia*. *Program Brief* 2019-03. WorldFish.
- Karrebaek, M. S., K. C. Riley, & J. R. Cavanaugh. 2018. Food and language: Production, consumption, and circulation of meaning and value. *Annual Review of Anthropology* 47(1): 17–32. <https://doi.org/10.1146/annurev-anthro-102317-050109>
- Keating, N. B. (2013). Kuy alterities: The struggle to conceptualise and claim Indigenous land rights in neoliberal Cambodia. *Asia Pacific Viewpoint*, 54(3), 309–322. <https://doi.org/10.1111/apv.12026>
- Kong, R., Diepart, J. C., Castella, J. C., Lestrelin, G., Tivet, F., Belmain, E., & Bégué, A. (2019). Understanding the drivers of deforestation and agricultural transformations in the Northwestern uplands of Cambodia. *Applied Geography*, 102, 84-98. <https://doi.org/10.1016/j.apgeog.2018.12.006>
- Lamberts, D. (2006). The Tonle Sap Lake as a productive ecosystem. *International Journal of Water Resources Development*, 22(3), 481–495. <https://doi.org/10.1080/07900620500482592>
- le Billon, P. (2000). The political ecology of transition in Cambodia 1989-1999: War, peace and forest exploitation. *Development and Change*, 31, 785–805. <https://doi.org/10.1111/1467-7660.00177>
- Mahanty, S. & Milne, S. (2016). Anatomy of a Boom: Cassava as a 'gateway' Crop in Cambodia's North-Eastern Borderland. *Asia Pacific Viewpoint* 57(2): 180-193. <https://doi.org/10.1111/apv.12122>
- Mahanty, S. (2022). *Unsettled Frontiers: Market formation in the Cambodia-Vietnam borderlands*. Southeast Asia Program, Cornell University.
- Mahood, S. P., Poole, C. M., Watson, J. E., MacKenzie, R. A., Sharma, S., & Garnett, S. T. (2020). Agricultural intensification is causing rapid habitat change in the Tonle Sap Floodplain, Cambodia. *Wetlands Ecology and Management*, 28(5), 713-726. <https://doi.org/10.1007/s11273-020-09740-1>
- McMichael, P. (2009). A food regime genealogy. *Journal of Peasant Studies*, 36(1), 139–169. <https://doi.org/10.1080/03066150902820354>
- McMichael, P. (2012). In the short run are we all dead? A political ecology of the development climate. In R. E. Lee & I. Wallerstein (eds.) *The Longue Durée and World-Systems Analysis*, (pp. 137–160). State University of New York Press.

- Marx, K. 1976[1887]. *Capital, Volume One: A critique of political economy*. Vintage Books.
- Mekong River Commission. (2021). Status and trends of fish abundance and diversity in the Lower Mekong Basin during 2007–2018. MRC Technical Paper No. 66. Mekong River Commission Secretariat. <https://doi.org/10.52107/mrc.qx5yo0>
- Montenegro de Wit, M. (2016). Are we losing diversity? Navigating ecological, political, and epistemic dimensions of agrobiodiversity conservation. *Agriculture and Human Values*, 33(3), 625–640. <https://doi.org/10.1007/s10460-015-9642-7>
- Moore, J. W. (2017a). Metabolic rift or metabolic shift? Dialectics, nature, and the world-historical method. *Theory and Society*, 46(4), 285–318. <https://doi.org/10.1007/s11186-017-9290-6>
- Moore, J. W. (2017b). The Capitalocene, Part I: On the nature and origins of our ecological crisis. *Journal of Peasant Studies*, 44(3), 594–630. <https://doi.org/10.1080/03066150.2016.1235036>
- Nunoo, F. K. E., Boateng, J. O., Ahulu, A. M., Agyekum, K. A., & Sumaila, U. R. (2009). When trash fish is treasure: the case of Ghana in West Africa. *Fisheries Research*, 96(2-3), 167–172. <https://doi.org/10.1016/j.fishres.2008.10.010>
- Padwe, J. (2011). Cashews, cash, and capitalism in Northeast Cambodia. In C. Hughes & K. Un (Eds.), *Cambodia's Economic Transformation* (pp. 123–153). NIAS Press.
- Patrick, D., Shaer, B., & Budach, G. (2017). Language and territorialization. *Semiotic Review*, (5). <https://www.semioticreview.com/ojs/index.php/sr/article/view/8>
- Peirce, C. S. (1992). *The Essential Peirce, Vol. 1* (N. Houser & C. Kloesel, Eds.). University of Indiana Press.
- Peirce, C. S. (1998). Sundry logical connections. In *The Essential Peirce, Vol. 2*. (the Peirce Edition Project, Ed.). (pp. 267–288). Indiana University Press.
- Picard, M. (2017). *The appropriation of religion in Southeast Asia and beyond*. Palgrave Macmillan.
- Pingali, P. (2007). Westernization of Asian diets and the transformation of food systems: Implications for research and policy. *Food Policy*, 32(3), 281–298. <https://doi.org/10.1016/j.foodpol.2006.08.001>
- Porée-Maspero, E. (1962). *Étude sur les rites agraires des Cambodgiens*, Vol 3. Mouton.
- Pretty, J. (2020) New opportunities for the redesign of agricultural and food systems. *Agriculture and Human Values*. 37, 629–630. <https://doi.org/10.1007/s10460-020-10056-2>
- Reisman, E. (2019). Superfood as spatial fix: the ascent of the almond. *Agriculture and Human Values*, 1–15. [10.1007/s10460-019-09993-4](https://doi.org/10.1007/s10460-019-09993-4)
- Reysoo, F. (2023). Emerging rural food markets in Kampong Thom (Cambodia). In J. B. Martignoni, C. Gironde, C. Golay, E. Prügl, & D. Tsikata (Eds.), *Agricultural commercialization, gender equality and the right to food* (pp. 73–91). Routledge. <https://doi.org/10.4324/9781003202004-5>
- RGC, Royal Government of Cambodia (2014a). *National Strategic Development Plan, 2014–2018*. Phnom Penh.
- RGC, Royal Government of Cambodia (2014b). *Cambodia climate change strategic plan 2014–2023*. Phnom Penh.
- Richardson, R. B., & Suvedi, M. (2018). Assessing the potential for small-scale aquaculture in Cambodia. *Environments*, 5(7), 76. <https://doi.org/10.3390/environments5070076>
- Ros, K. (2019). Current Status of sustainable aquaculture and resource enhancement in Cambodia. In, Aya, F. A., de La Peña, L. D., Salayo, N. D., & Tendencia, E. A. (eds.) *Aquatic animal health, and resource enhancement in Southeast Asia*, 25-27 June 2019, Iloilo City Philippines. Southeast Asian Fisheries Development Center Aquaculture Department.
- Sahlins, M. (1972). *Stone Age Economics*. Aldine Atherton, Inc.
- Satizábal, P., & Dressler, W. H. (2019). Geographies of the Sea: Negotiating human–fish interactions in the waterscapes of Colombia's Pacific Coast. *Annals of the American Association of Geographers*, 109(6), 1865–1884. <https://doi.org/10.1080/24694452.2019.1587282>
- Schneider, M., & McMichael, P. (2010). Deepening, and repairing, the metabolic rift. *The Journal of Peasant Studies*, 37(3), 461–484. <https://doi.org/10.1080/03066150.2010.494371>

- Scott, J. C. (2017). *Against the grain: a deep history of the earliest states*. Yale University Press.
- Seng, K. (2015). The effects of nonfarm activities on farm households' food consumption in rural Cambodia. *Development Studies Research*, 2(1), 77–89. <https://doi.org/10.1080/21665095.2015.1098554>
- Sok, Chan (2020). Farmers need new skills, technology and research to become international. *Khmer Times* Feb 20, 2020. <https://www.khmertimeskh.com/50683980/farmers-need-new-skills-technology-and-research-to-become-international/>
- Soper, R. (2020). From protecting peasant livelihoods to essentializing peasant agriculture: problematic trends in food sovereignty discourse. *Journal of Peasant Studies*, 47(2), 265–285. <https://doi.org/10.1080/03066150.2018.1543274>
- Sorn, Sarath (2020). Farming needs new skills, says expert. *Khmer Times* June 6, 2020. <https://www.khmertimeskh.com/50734362/farming-needs-new-skills-says-expert/>
- Sprenger, G. (2017). Communicated into being: Systems theory and the shifting of ontological status. *Anthropological Theory*, 17(1), 108–132. <https://doi.org/10.1177/1463499617699330>
- Sprenger, G. (2018). Buddhism and coffee: The transformation of locality and non-human personhood in Southern Laos. *Sojourn: Journal of Social Issues in Southeast Asia*, 33(2), 265–290. <https://doi.org/10.1355/sj33-2b>
- Swift, P. & Cock, A. (2015). Traditional Khmer systems of forest management 1. *Journal of the Royal Asiatic Society*, 25(1), 153–173. <https://doi.org/10.1017/S135618631400039X>
- Suhardiman, D., Giordano, M., Leebouapao, L., & Keovilignavong, O. (2016). Farmers' strategies as building block for rethinking sustainable intensification. *Agriculture and Human Values*, 33(3), 563–574. <https://doi.org/10.1007/s10460-015-9638-3>
- Sumner, D., Christie, M. E., & Boulakia, S. (2017). Conservation agriculture and gendered livelihoods in Northwestern Cambodia: decision-making, space and access. *Agriculture and Human Values*, 34(2), 347–362. <https://link.springer.com/article/10.1007/s10460-016-9718-z>
- Todd, Z. (2014). Fish pluralities: Human-animal relations and sites of engagement in Paulatuuq, Arctic Canada. *Etudes Inuit Studies*, 38(1–2), 217–238. <https://doi.org/10.7202/1028861ar>
- Tucker, W. (2015). *Lifting the Veil: Deforestation disguised as agriculture in Cambodia*. Forest Trends. <http://forest-trends.org/blog/2015/08/13/lifting-the-veil-deforestation-disguised-as-agriculture-in-cambodia/>
- Turreira-García, N., Argyriou, D., Phourin, C., & Theilade, I. (2017). [Ethnobotanical knowledge of the Kuy and Khmer people in Prey Lang, Cambodia](#). *Cambodian Journal of Natural History*, 1, 76–101.
- Vannak, Chea (2018, January 19th). MoU to boost cashew output to 1 million tonnes. *Khmer Times*, <https://www.khmertimeskh.com/103113/mou-boost-cashew-output-1-million-tonnes/#:~:text=The%20Ministry%20of%20Agriculture%2C%20Forestry,1%20million%20tonnes%20a%20year.>
- Vilain, C., & Baran, E. (2016). Nutritional and health value of fish: The case of Cambodia. In *Working Papers*. Inland Fisheries Research and Development Institute (Fisheries Administration) and WorldFish.
- Wolfe, P. (1999). *Settler colonialism and the transformation of anthropology: The politics and poetics of an ethnographic event*. Cassell.
- Woodley, E. (1991). Indigenous ecological knowledge systems and development. *Agriculture and Human Values*, 8, 173–178.
- Work, C. 2020. *Tides of Empire: Religion, development, and environment in Cambodia*. Berghahn Books.
- Work, C. (2019). Chthonic Sovereigns? "Neak Ta" in a Cambodian village. *The Asia Pacific Journal of Anthropology*, 20(1), 74–95. <https://doi.org/10.1080/14442213.2018.1553205>
- Work, C., & Thuon, R. (2017). Inside and outside the maps: Mutual accommodation and forest destruction in Cambodia. *Canadian Journal of Development Studies / Revue Canadienne d'études Du Développement*, 38(3), 360–377. <https://doi.org/10.1080/02255189.2017.1309313>

Worldfish. (2019). *Commercialization of Aquaculture for Sustainable Trade (CAST) Cambodia: Baseline Study Report*. Phnom Penh: American Soybean Association (ASA) and World Initiative for Soy in Human Health (WISHH).

World Bank. (2017). Cambodia: Sustaining strong growth for the benefit of all. Washington, D.C. Retrieved from <https://hubs.worldbank.org/docs/imagebank/pages/docprofile.aspx?nodeid=27520556>