



Research

## ***The Flow of Peasant Lives*: a board game to simulate livelihood strategies and trajectories resulting from complex rural household decisions**

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**ABSTRACT.** Since the 1990s, many of neoliberalism's policies for growth and development have contributed to the deterioration of living conditions for rural peasants who are marginalized and unwilling or unable to abandon their lands. In every nation in which this phenomenon is prevalent, the resulting impoverishment of rural peasants has motivated numerous academic studies and poverty-alleviation programs. Concurrently, peasants have been developing and modifying their strategies for social reproduction, under conditions that are usually uncertain and restrictive. Here, we describe the design and implementation of a serious board game called *The Flow of Peasant Lives* (TFPL). TFPL is a complex but player-friendly game that was developed and parameterized using information and first-hand knowledge that the authors gained through 15 years of interaction and discussion with peasant residents of La Sepultura Man in the Biosphere-United Nations Educational, Scientific and Cultural Organization Biosphere Reserve in Chiapas, Mexico. The game was implemented in November 2017 in workshops held in six rural communities in the Sierra Madre of Chiapas, Mexico. During the workshops, 126 participants made 21,600 recorded decisions about capacity allocations during 393 simulated years of rural life. Strategies followed by members of rural households (as a team) led the game along ascendant, descendant, and oscillatory trajectories in the reproduction of capabilities, as is actually the case in rural life contexts. The great majority of academic approaches seeks to influence the transformation of rural life starting from preconceived notions about peasants' needs. In contrast, TFPL is a social-immanent learning tool that provides a safe, fun venue where rural households can make their realities explicit, exchange ideas, explore possibilities for action, and discuss what needs to be changed. It has great potential for transfer to other rural contexts because it balances research components that are nomothetic (general) with ones that are ideographic (particular).

**Key Words:** *immanent social learning; livelihoods; rural households; serious board game; social reproduction; transferability*

### **INTRODUCTION**

Although urban areas have grown rapidly during recent decades, approximately 46% of the global population, including 80% of the world's poor, live in rural areas (World Bank 2020). The complex reality of the majority of poor rural populations is characterized by social exclusion, inequitable economic exchanges, malnutrition, deficient public services such as education and healthcare, and lack of employment opportunities (de la O Campos et al. 2018). Academic interest has grown in identifying and understanding strategies that rural households (RHs) develop to subsist in such environments, and conditions that RHs must overcome and change to improve their lives.

To understand how RHs confront their difficult life conditions and how they may improve them, there is a need to understand their social reproduction on an intracommunitarian level as well as on a social-class level using historical analytical approaches. Social reproduction research analyzes the subsistence conditions of social classes based on their economic activities, subjectivities, and internal social relations, as well as the multiple relationships they establish with the broader economic system and political-ideological regimes (Bourdieu 1973, Long 1984, Godelier 1991, Narotzky 2004).

In the 20th century, Mexico's peasant class (or "preclass") has transitioned through many phases. As a result of the Mexican Revolution (1910–1917), they were able to obtain land and

thereby escape exploitation on haciendas based on indentured servitude. From the early 1950s to approximately 1970, they played a central role in federally subsidized food production during a period of national food self-sufficiency (the so-called "Mexican miracle"). In the 1980s, they were negatively affected by withdrawal of subsidies, for example, during the "Uruguay Round" of multilateral trade negotiations under the General Agreement on Tariffs and Trade (precursor to neoliberalism). As a result of the 1994 North American Free Trade Agreement (NAFTA), they underwent further socioeconomic and political reorganization (Cornelius and Myhre 1998, Barkin 2002). Before such neoliberal policies, social reproduction of Mexico's peasant class occurred as a result of socioeconomic pluriactivity within their territories, involving subsistence agriculture, government subsidies to produce food for the national market, agricultural wage labor, and regional migration. However, this situation gave way to interaction with multiple actors and development agendas such as agroexportation markets and environmental conservation policies (e.g., payment for environmental services, ecotourism, agroforestry projects), receiving welfare monetary handouts, and migrating as cheap labor in international labor markets.

Implementation of neoliberalism worldwide (Fletcher 2019) led rural studies researchers to seek to understand the political, economic, and sociocultural impacts on the social reproduction of rural peasant societies (Ellis 1998, Kay 2008). While formerly classical structuralist approaches (political economy and theory

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of dependence) and agency-based approaches (microeconomy and rational choice) were most common in rural studies, poststructuralist approaches incorporating historical-structural conditions as well as the peasants' capacity for action (Long 2003, den Haan and Zoomers 2005) began to prevail. The most influential poststructural approach to social reproduction has been the rural livelihood framework.

Rural livelihood framework analyzes patrimonies, capacities, services, rationalities, and subjectivities that RHs use to ensure their subsistence, exploring connections between their microworlds (e.g., family development, internal division of labor) and the macroworlds in which they are immersed (e.g., nation-states and modern world economies; Chambers and Conway 1992, Ellis 2000, Scoones 2009). The principal goal of the rural livelihood framework is to contribute to improving the livelihoods of rural peasant societies by influencing the agendas of multilateral organizations and public policy to counteract social vulnerability by strategically injecting finances and training to improve peasants' social, human, natural, physical, and financial capital (Scoones 1998, Bebbington 1999). To promote sustainable livelihoods, it is important to study not only RH strategies (behavior and decision making) but also RH trajectories (paths resulting from strategies; de Haan and Zoomers 2005).

Within the few rural livelihood framework analyses that have simulated peasant strategies and trajectories over time (e.g., Sallu et al. 2010, van den Berg 2010, Olsson et al. 2014, Rebai and Alvarado-Vélez 2018), three central gaps have been identified: (1) analyzing both livelihood strategies and trajectories in a nested manner (criticism by de Haan and Zoomers 2005), (2) simulating social contexts to evaluate livelihood scenarios (e.g., Magliocca et al. 2013, Debnath and Bardhan 2018), and (3) promoting participation by RHs in an immanent (facilitating social learning) rather than interventionist manner (criticism by Morse and McNamara 2013, Herrera et al. 2019).

One step in addressing the gaps identified in the rural livelihood framework is through serious board games such as *The Flow of Peasant Lives* (TFPL) whose design, implementation, and general results we describe here. TFPL is a complex but easy to use board game that provides a safe, stylized space in which members of a RH as a team may implement a set of interdependent capacities (understood as an abstraction of all the RH's resources) with respect to eight different livelihood activities to develop strategies and observe the dynamic consequences or trajectories, which may be ascendant, oscillatory, or descendant with respect to reproduction of capacities. During 10 rounds (years) of TFPL, RHs must continually respond to changing conditions that result from their prior decisions and from their interactions with external actors (social fields in Bourdieu's [1973] terms). In the game, RHs must maintain or increase their capacities in order to function year by year and in the long range in their rural territory.

TFPL is a participatory social learning tool that allows RHs not only to foresee the obvious consequences of their daily actions, but also to undergo an explanatory iterative process to make decisions and evaluate and react to the consequences. Through multidimensional mapping of one time to another (intertemporal), the game also functions as a social simulator that

offers explicit, detailed profiles of livelihood strategies developed on the board by RHs, and of their trajectories as they fail or succeed to reproduce capacities resulting from these strategies. This tool was developed and parameterized based on information and knowledge resulting from 15 years of researchers' interactions and discussions with RHs of the Man and the Biosphere-United Nations Educational, Scientific and Cultural Organization (MAB-UNESCO) La Sepultura Biosphere Reserve in Chiapas, Mexico (for our most recent review, see García-Barríos et al. 2020). Since 1950, RHs of La Sepultura have inhabited a territory with a dynamic social-environmental history that has been highly disputed among a variety of local and external actors. Therefore, they continually have had to reorganize their livelihoods drastically. In a stylized but realist manner, TFPL simulates challenges that a RH faces daily to assure their means of subsistence while it generally represents the current social reproduction conditions of peasantry and their ascending, stationary, or descending livelihood trajectories in highly classist societies such as Mexico, which have opened to global economies in recent decades. Thus, TFPL is a participatory research tool that establishes a balance between idiographic (contextualized) and nomothetic (generalized) traits of design that allow for adjusting the parameters to adapt to a broad diversity of rural peasant contexts (Gilbert and Ahrweiler 2006).

TFPL is not a typical microeconomic game of rational choice, accounting, and efficiency in which we seek simply to inform RHs of how they may optimize their means of subsistence (interventionist approach). Rather, TFPL is: (1) a means that allows RHs to explore (and reflect upon) the ways they continuously and adaptively respond to the outcomes of previous decisions and their uncertain outcomes while attempting to ensure subsistence under contemporary living conditions; (2) a tool of action that does not dictate the needs and proper roles of the peasantry within society but rather contributes to help RHs and their current and potential allies to comprehend and to seek to transform the difficult conditions in which they reproduce their lives (immanent approach); and (3) a dynamic, multidimensional vehicle for academic analysis capable of transcending the static momentary images developed by the large majority of descriptive theoretical studies regarding the peasantry and rural life.

This first article regarding TFPL describes: (1) how the game was designed and parameterized; (2) how our research team explored the different strategies (sets of adaptive decisions) players can display in an attempt to balance the reproduction of codependent capacities in uncertain conditions; (3) some features of the game's solution space, namely its capacity to generate ascending, stationary, and descending trajectories; and (4) how 44 households teams (HTs; 126 individuals) from the Sepultura study area played the game (both separately and interacting with other RHs), understood its rationale and mechanics, actualized their livelihood decisions every year (round), and reflected upon their resulting RH trajectory and outcome. It is worth noting that, for a number of reasons, no attempt was made in this first study to correlate each RH's actual life story and socioeconomic trajectory with its game decisions and results. Finally, we discuss the game and workshop strengths and limits and the possibilities for adapting these learning tools to other rural conditions.

## METHODS

### Study site and the participatory action research process

Located in the neotropical Sierra Madre mountain range of the southeastern Mexican state of Chiapas, the El Tablon River Upper Watershed (TRUW) comprises approximately 30,000 ha. The altitude ranges from 800 to 2550 m, with a varied climatic gradient and a dense network of permanent and seasonal streams. The TRUW's six forest types form a highly diverse biome.

Within a rapidly changing territory disputed among multiple actors, the RHs of the TRUW have continually undergone drastic changes in their livelihood strategies. In just > 50 years, they have gone from being indentured servants in enclave economies under the yoke of forestry, livestock, and coffee hacienda owners to forming *ejidos* (agrarian communities with collective property rights and decision making) beginning in the 1960s (Cruz-Morales 2014), and cultivating maize and beans for family consumption. They participated in the national agricultural boom of the 1970s and 1980s and experienced an economic collapse in the 1990s as a result of NAFTA. In the 1990s, the TRUW underwent socioeconomic reorganization toward small- to medium-scale livestock raising; the region was decreed as the La Sepultura Biosphere Reserve and incorporated into the MAB-UNESCO conservation and social well-being program; and national and international nongovernmental organizations have promoted "green economy" agroforestry projects such as production of shade coffee, extraction of *Pinus oocarpa* resin for use in manufactured household products, and harvest and sale of ornamental *Chamaedora* palm (Adams 2017, García-Barrios and González-Espinosa 2017).

Currently, the TRUW includes approximately 1500 RHs in 12 *ejidos*. The RHs carry out a multiplicity of labor activities within and outside their territory to ensure their social reproduction. Depending on the amount of land and other means of production that they possess, as well as their family structure, the RHs' economic activities include maize and bean cultivation for family consumption, small- to medium-scale livestock raising, and other agroforestry cropping for market (Zabala et al. 2017). Other significant income sources include remittances from migration within Mexico or to the United States and monetary handouts by the federal government (García-Barrios et al. 2009). As they carry out their social reproduction strategies, the RHs of the TRUW interact with multiple local and external actors, who are frequently more powerful than them, with whom they establish alliances as well as tensions and disputes regarding forms of appropriating and managing their territories (García-Barrios et al. 2012).

We began to work as a research team in the TRUW within this plethora of actors and territorial agendas in 2005. Following thenovel ideas regarding agro-diverse landscapes for conservation and social well-being (Harvey et al. 2008, Perfecto and Vandermeer 2010), we collaborated with local and external actors in a project to transition semi-extensive cattle-raising toward a silvopastoral model (García-Barrios et al. 2012). As we became aware of regional power asymmetries with respect to governance, we shifted our collaboration toward accompanying peasant organizations in not only their productive processes but also their negotiations with external actors.

Several years ago, we initiated participatory action research to accompany RHs in developing processes of social learning (in the short term) and popular education (in the medium range; Freire 1982, Fals-Borda and Rahman 1991) involving design and implementation of role-playing and other serious board games and agent-based models (Bousquet et al. 2002, Agar 2005, Janssen and Ostrom 2006, Richiardi et al. 2006, den Haan and van der Voort 2018, Redpath et al. 2018). We have worked closely with actors of the TRUW using such games and models to analyze scenarios and stylized representations that: "

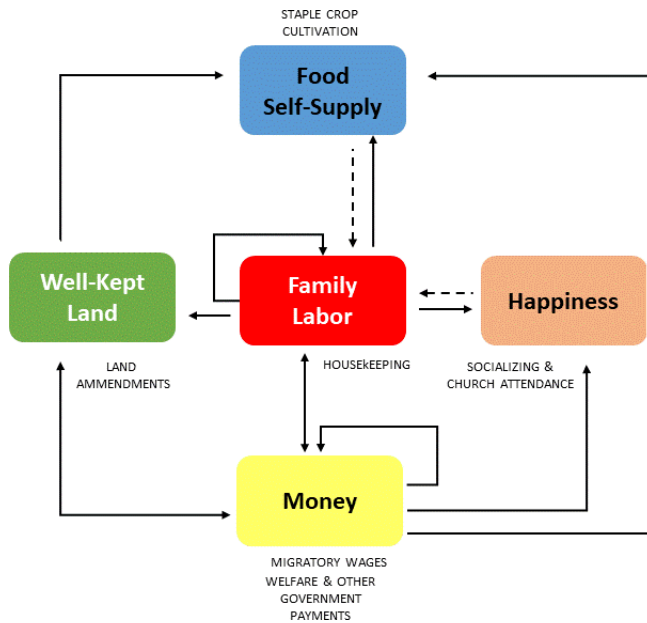
1. Simulate peasants' challenges and dilemmas upon coordinating to conserve forests and water and ameliorate detrimental effects of ecological externalities (García-Barrios et al. 2011, 2015);"
2. Involve peasants in multifunctional ecosystem design and planning (Speelman et al. 2014a,b);"
3. Identify potential motivations of rural teenagers for conserving their natural and agricultural heritage (Meza-Jiménez et al. 2016);"
4. Promote peasants' understanding of complex ecological processes governing recurrent pests and diseases in shade-grown coffee groves affected by the *la roya* (coffee rust) fungus (García-Barrios et al. 2016, 2017);"
5. Explore management methods that might ensure long-term sustainability of pine resin harvesting (Braasch et al. 2018); and"
6. Attempt to understand the generational gap for collaborative rural work between adult and youth peasants (Castro-Salcido 2020).

### Design and functioning of *The Flow of Peasant Lives*

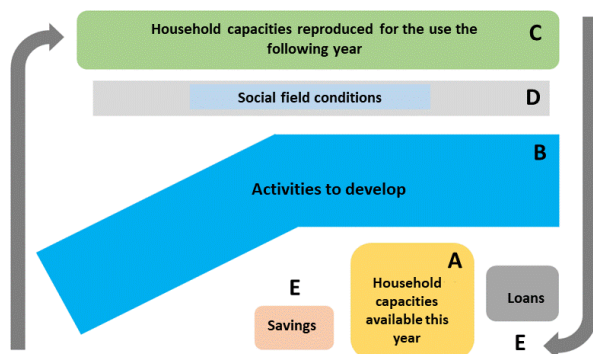
TFPL is a tool to simulate social dynamics that elucidates the decisions that RHs make to reproduce their livelihoods over a 10-year period. As a result of 15 years of research in the TRUW, we have observed the following capacities, resources, and activities as being central to the social reproduction of a RH: labor, housekeeping, agricultural land, food production for family consumption, agricultural and nonagricultural remunerative activities, and a sense of satisfaction derived from life in the family and in society. According to our theoretical model, these capacities, resources, and activities make up five interdependent state variables (Fig. 1).

Based on this model, we formulated a board game with a cyclic structure (Figs. 2 and 3) that includes a "toolbox" and an "operating space" (Barreteau et al. 2003) in which a HT (father, mother, and one teenager) negotiates how it will use its capacities. The toolbox and the operating space are stylized representations of the HT's capacities and the activities by which it may use those capacities. Capacities and nonpermanent resources are represented by five types of tokens that the HT may use at any of eight stations along a flowing river. These stations represent the following eight activities: crop production for family consumption; caretaking of land; housekeeping; coffee growing; a combination of cattle-raising and harvesting pine resin and ornamental palms; migrating to work in the United States and northern Mexico; receiving welfare, payments for environmental services, and other land-related monetary subsidies; and socializing and spiritual activities.

**Fig. 1.** Stylized model of interdependence among capacities employed by rural households to reproduce their livelihoods. Arrows indicate that the capacity from which the arrow emanates is required to reproduce the capacity to which the arrow points. Dotted arrows indicate that the capacity may or may not be necessary to reproduce the targeted capacity.



**Fig. 2.** Basic cyclic structure of the board game, which may be adapted to other rural contexts by varying its parameters. (A) Players have a set of capacities to be assigned to several of the eight different activities. (B) Players choose among the activities, which require different levels of the capacities. (C) Each activity generates one capacity to be used in the following year. (D) The social fields (or dice) represent the probability of a rural household’s success or failure in generating capacities resulting from each activity selected as a result of ecological, political, and market uncertainties. (E) Players may spend their savings for a “wild card” token or take a loan from a local loan shark.



At the beginning of the game, the HT has 21 tokens (Fig. 4). The HT “spends” these tokens along the river and then rolls two six-sided dice to determine gains for the “year”, according to the specific parameters (Fig. 5). The HT then collects tokens corresponding to these gains, and the river “carries away” (consumes) the first year’s results as well as any tokens that have not been spent, except those representing money. All tokens representing the year’s gains are placed at the bottom of the board for use the following year. Because the tokens used in one year are consumed, the year’s gains must be sufficient according to game rules for the HT to continue playing. The game continues until the HT either lacks sufficient tokens to continue or has survived 10 rounds.

The rules and details of the game add to its complexity, enjoyment, and realism. Before using their tokens for the year, the HT may borrow “money” tokens (to be repaid plus 50% interest at the end of the year) or pawn the “cow” that they received at the beginning of the game. Upon pawning the cow, the family receives two tokens of any type(s) they choose. The HT may redeem the cow at the start of any subsequent year by repaying any two tokens but must wait one year before pawning it again. Thus, the cow is a valuable resource and a sort of “wild card”, whose effective use requires foresight, self-control, and the habit of saving.

Another feature is that gains for a given activity ( $A_i$ , where  $i = 1, 2, \dots, 8$ ) for a given year may be low or high depending on the roll of the die assigned to each activity. This feature represents not only market volatility, but also uncertainties resulting from the peasants’ disadvantageous power relationships when negotiating with external actors. If outcome  $X$  of the roll for activity  $A_i$  exceeds a predetermined value  $X_i$ , the HT will receive the higher of the gains stipulated on the game board for that activity (Fig. 5); it receives the lower of the gains if the outcome is  $\leq X_i$ . Stated more formally, the long-term probability  $P_i$  of gaining the higher number of tokens for activity  $A_i$  is  $(6 - X_i)/6$ , while the long-term probability of gaining the lower number is  $1 - P_i$ . As the HT quickly understands, activities with high  $X_i$  will often turn out unfavorably in the game (Fig. 5), just as these activities tend to turn out unfavorably in real life because peasants must carry them out under disadvantageous conditions (e.g., influenced by power relations; Bourdieu 1998, Long 2003, Ostrom 2005).













#### Workshops to implement *The Flow of Peasant Lives*

TFPL was played in November 2017 in workshops in six *ejidos* of the TRUW. A total of 126 people composing 44 RHs participated (man, woman, and one teenager). Each 8-h workshop was guided by 10 facilitators (two researchers, six postgraduate students, and two undergraduates) and a general coordinator, and consisted of the following five steps. "

1. Workshop objectives were presented and a general questionnaire was applied to one representative of the HT regarding the family’s activities and decision-making processes."
2. HTs were trained to play the game."
3. A 10-round single-family game (Fig. 6) was played, followed by a collective discussion."
4. In each workshop, one or two groups of four HTs played multifamily games (Fig. 6). Three rounds were played



**Fig. 5.** Household capacities required for undertaking each activity, outcomes of a dice throw representing favorable or unfavorable social field condition for each activity, and household capacities reproduced as a result of each activity.

Activities	Household capacities required					Field conditions		Household capacities reproduced				
	M	L	W	S	H			M	L	W	S	H
						Favourable						
Socializing and spiritual activities	1	1					2,3,4,5,6					1
							1					0
Self-supply food production	1	1	1			3,4,5,6					1	
						1,2					0	
Land keeping	1	1					2,3,4,5,6			4		
							1			3		
Household keeping*	1	1		1	1	3,4,5,6			7			
						1,2			6			
Coffee (cash crop 1)	2	1	1				4,5,6	4				
							1,2,3	2				
Cattle, resin, and palm (cash crop 2)	2	1	1			4,5,6		4				
						1,2,3		2				
Wage-labour in USA and northern Mexico	4	3					5,6	10				
							1,2,3,4	5				
Welfare, PSA, and other land-related monetary transfers	1	1				2,3,4,5,6		3				
						1		2				

\* Household keeping is the only activity that doesn't specify a fixed set of capacities. (But M and L are required.) Reproduction is proportional to the number of tokens allocated.

M: Money  
 L: Labour and time  
 W: Well-kept land  
 S: Self-supplied food  
 H: Happiness

**Fig. 6.** Rural families playing *The Flow of Peasant Lives*. (A) Single-family session. (B) Multifamily session. (C) Debriefing session.



## RESULTS

### Exploration of strategies and trajectories of the game by the research team

To comprehend the diversity of possible empirical results that TFPL can generate with the parameters calibrated in consultation with selected informants, our research team explored the results of contrasting levels of labor capacity reproduction (housekeeping) and defined the upper and lower limits of possible trajectories under two different conditions: pawning and not

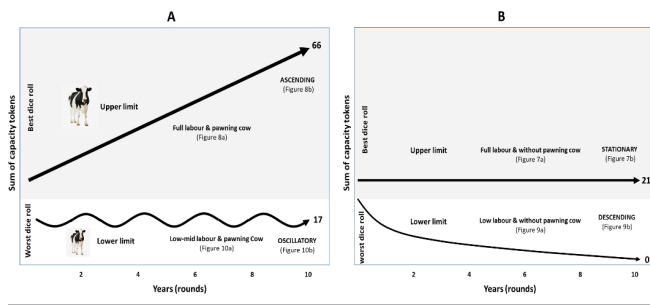
pawning the cow (Fig. 7). First, we explored the upper limits of TFPL's solution space by simulating only favorable conditions in the social fields (high roll of the dice) using a game strategy that maximizes labor reproduction and balances commercial and self-supply agriculture while receiving government welfare and other payments (Fig. 8A). This strategy led to a fixed point in capacity reproduction (Fig. 8B). We then repeated the strategy alternating the use of the cow and obtaining money by selling crops or migrating (Fig. 9A). This strategy generates a rapidly ascending trajectory of capacities (Fig. 9B).

Later, we explored the lower limits of TFPL's solution space, simulating only unfavorable conditions in the social fields (low roll of the dice) and using a strategy that minimizes labor reproduction, without pawning the cow, while receiving government welfare payments (Fig. 10A). This strategy leads to a descending trajectory of capacity reproduction (Fig. 10B). We completed this screening of qualitative trajectories by simulating only unfavorable conditions of the dice with a strategy that alternated between low and medium labor reproduction, pawning the cow, migratory labor, and receiving government welfare and other payments (Fig. 11A). This strategy leads to an oscillatory trajectory with low levels of capacity reproduction (Fig. 11B).

After the workshops, we analyzed the frequency distribution of ascendant, stationary, and descendant trajectories among RHs in the single-family game. By developing their own strategies, and under conditions of uncertainty in the social fields (players rolling the dice), 27% of the 44 HTs obtained an oscillatory livelihood trajectory (6–17 tokens after round 10) and 25% obtained a slow

ascending trajectory (22–41 tokens). Another 25% descended and collapsed (0 tokens), and the remaining 23% slowly descended without collapsing (1–5 tokens). As expected, two of the boundary conditions of the solution space (rapid ascendance and stationary equilibrium) did not occur, but collapse before year 10 was much higher than expected, caused by unfavorable decisions rather than low rolls of the dice. Overall, these results confirmed that actual RH game outcomes were not biased toward a favorable or unfavorable type of trajectory but rather spanned the solution space.

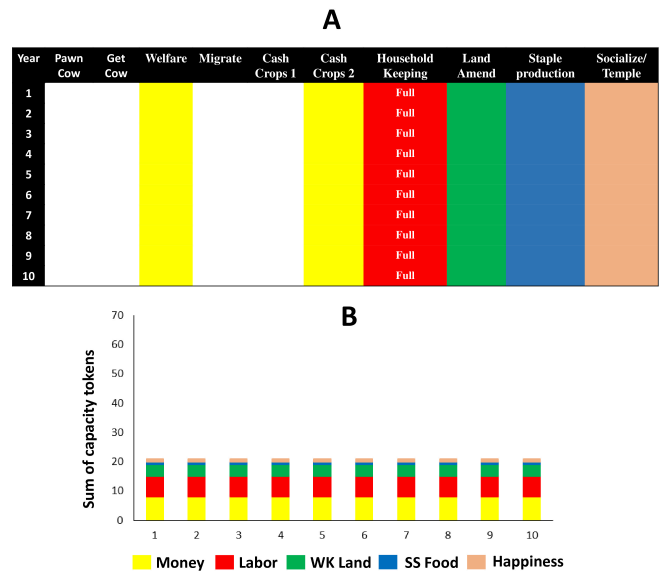
**Fig. 7.** Exploration of solution space in *The Flow of Peasant Lives* by the research team (internal validation of the game). (A) Upper limit (ascendant trajectory) and lower limit (oscillatory trajectory) of generating capacities while pawning the cow and using different levels of labor under favorable and unfavorable conditions of the dice (social fields). (B) Upper limit (stationary trajectory) and lower limit (descendent trajectory) of generating capacities without pawning the cow and using different levels of labor under favorable and unfavorable conditions of the dice.



In the single-family game session, 25% of HTs evolved an ascending trajectory of capacities while 75% evolved oscillatory or descending trajectories. In real life, in the *ejidos* where the game was played, only approximately 10% of the peasant families have life stories of rising income while close to 90% face oscillatory conditions or cases of descending income (see our most recent work on peasant differentiation in the TRUW; Rivera-Núñez et al. 2020). There is a general coincidence in trends, yet we make no claims at this stage of true correspondence because: (1) workshops and the game itself are not designed to prove specific correspondence between players' real life adaptive strategies and those developed by them during the game; and (2) in real life, RHs are endowed differently, and additional processes play out in real-life differentiation among RHs.

As shown in the theoretical model of TFPL (Fig. 1), we posed that the principal critical decision in the game is what level of labor reproduction is pursued. We confirmed that housekeeping is a HT's fundamental activity, as demonstrated by data from the single-family sessions. We fitted a linear and a 3rd-degree polynomial model in both of which  $X$  is the total quantity of tokens used by the HT over the 10 years for housekeeping, and  $Y$  is the total quantity of tokens obtained by the HT over the 10 years. We carried out a regression separately for cases of HTs that solicited loans because they have a strong negative effect on capacity trajectories.

**Fig. 8.** (A) Simulation of a single household team using a playing strategy that obtains an outcome in the upper limit of the solution space in *The Flow of Peasant Lives*. Dice outcomes are assumed to favor the household team in every round. As with the strategy addressed in Fig. 7A, this strategy uses a full level of labor and balances household-keeping with earning monetary income but uses no savings. (B) Dynamics of stationary capacity reproduction resulting from the strategy shown in (A). The horizontal axis shows the sequence of rounds.



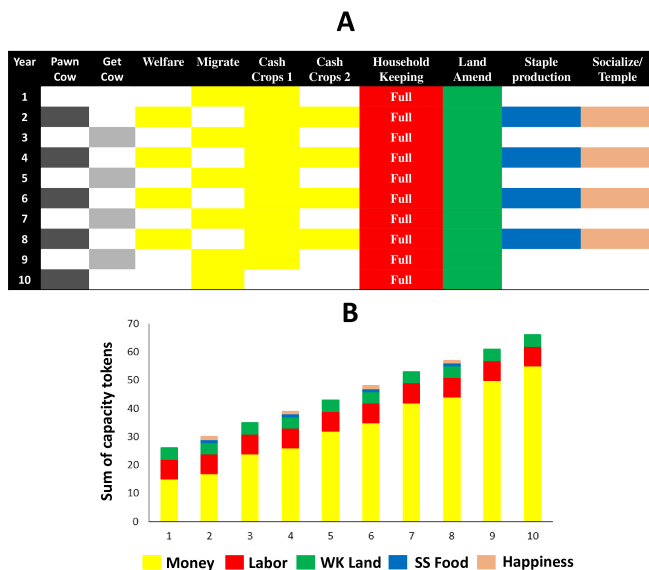
The linear model was significant for the case with debts ( $R^2 = 0.23$ ,  $P < 0.005$ ) but had poor fit for the case without debts ( $R^2 = 0.05$ ,  $P < 0.05$ ; Fig. 12). Nevertheless, the latter case had better fit when modeled using a third-degree polynomial ( $R^2 = 0.34$ ,  $P < 0.005$ ). This result indicates that effectively housekeeping is the principal activity, and that upon which the other activities depend, of any strategy of capacity reproduction, although in a nonlinear manner. Devoting too many or not enough capacities to generating tokens representing labor ends up reducing total capacity reproduction. This is another favorable attribute of parameterizing TFPL, given that despite the fact that the HTs identify housekeeping as a central activity of the game, its reproduction involves weighting limited capacities with other activities in a nontrivial manner to reach an equilibrium among interdependent capacities.

In the questionnaires applied at the end of the workshop, 90% of HTs expressed having fully understood the game rules and considered the components represented in the game to be very realistic. In addition, 85% of HTs considered the game to represent very closely the difficulties, opportunities, and decisions that their family must make to ensure their social reproduction. Seventy percent of HTs considered that jointly experiencing and visualizing the dynamic planning process regarding social reproduction of rural life was illuminating. We provide some participant comments that were shared during debriefing with respect to the relevance of the game to their lives and its realism (Table 1).

**Table 1.** Participant comments regarding the relevance of the game to their lives during the single-family session and the few instances of cooperation during the multifamily session.

Topic	Participant observation	Gender and age
Relevance and realism of the game	“It’s a trial of rural life – of how to move forward based on ways of working.”	Teen girl
	“For me it’s a game and it can also be a reality. [It’s] perfect because we get ideas of how we can work.”	Man
	“The game seems like reality because in life you have to know how to make good decisions to obtain benefits, but the decisions that one makes always have their risks. One doesn’t know if things will go as they thought or not, and the game deals with that; if you make good decisions you win and if not, well, things go bad. Besides, you have to see the risks and the costs involved in carrying out a certain activity.”	Teen boy
	“We don’t feel it’s too difficult to make decisions because there we were together as a family: father, mother, and children. That’s something good about the game, that it allows for playing it as a family and knowing how each of us thought, to later decide and take on what happens as a team.”	Man
	“I think this game is very good for young folks that are starting out or that are about to start out, so that they learn to decide better and not make mistakes, as many of us have done here in our <i>ejido</i> .”	Woman
	“The game helps us to see how the community confronts problems each day – how we move forward, and that despite the fact that we feel everything is against us, the future generations – that, in this case, us teens – are also going to move forward.”	Teen girl
Observations regarding the few instances of cooperation among household teams	“We worked alone because we were ashamed to talk about what was happening to us.”	Woman
	“It depends on the capacity that each one has. If we’re competent, we continue this way [alone]. If not, each family that needs something has to ask for it. I feel competent to continue alone.”	Man
	“If we had known that they [the other team that we lent to] wouldn’t have paid better, we would have let them die.”	Teen boy
	“If we don’t have anything either, how are we going to give something to them?”	Woman
	“We lacked communication to be able to support each other.”	Teen girl
	“If we in our family were to help each other, I think there wouldn’t be so many migrants to [the United States].”	Man

**Fig. 9.** (A) Simulation of a single-family game using a playing strategy that results in an outcome in the upper limit of the solution space in *The Flow of Peasant Lives*. Dice outcomes are assumed to favor the household team in every round. As with the strategy addressed in Fig. 7A, this strategy uses a full level of labor. However, this household team also pawns their cow (savings) and balances a pluriactivity monetary economy with household-keeping. (B) Dynamics of rapid capacity reproduction resulting from the strategy shown in (A). The horizontal axis shows the sequence of rounds.



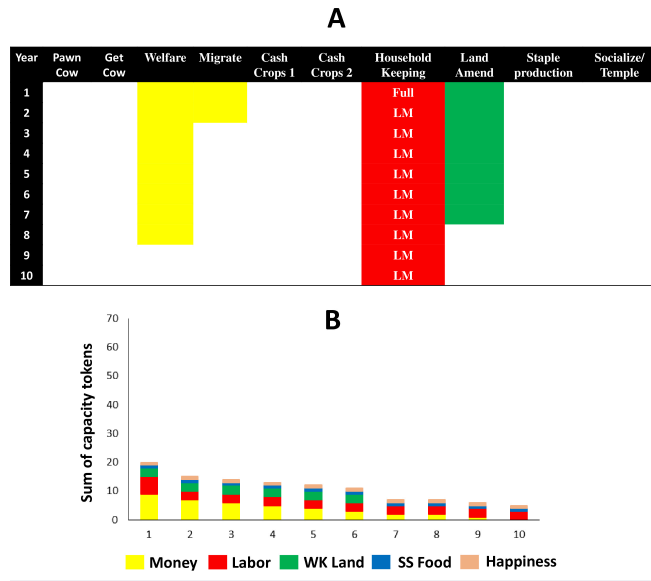
**Interactions among household teams during the multifamily session**

The multifamily sessions simulated a total of 400 rounds of the game (40 game boards multiplied by 10 game rounds), within which only 35 interactions among RHs occurred. Of those interactions, 15 involved one HT loaning tokens to another, and 20 involved exchanging one token type for another. These 35 interactions involved a total of 55 movements of tokens: 20 representing money, 20 for labor, and 15 for land. The number of tokens per movement varied from one to three, with one token being the most frequent movement. Interactions took place among HTs in only 11% of the years of social reproduction (including nine instances of returning tokens). Despite the low numbers of interactions, collapse of HTs diminished from 25% in the single-family session to 7% in the multifamily session.

To illustrate the HTs’ lived experiences during the multifamily session, we show a series of accounts that faithfully capture the principal aspects that explain the lack of cooperation among TRUW peasant families (Table 1). These accounts highlight issues such as reproductive independence of households, minimal capacity for interfamilial support given the shared marginalized condition, the social shame generated from soliciting economic support from other families, the lack of community communication strategies, and the social contractual relations among families. We have observed very strong reactions to the game’s playing conditions at the TRUW. For example, the statement, “If we had known that they [the opposing team that received the loan] would not pay later, we would have left them to die,” has real meaning when community members apply for rural loans that they cannot finally repay, and from which some families end up dispossessing others of their means of production (such as land and livestock).



**Fig. 10.** (A) Simulation of a single-family strategy that results in an outcome in the lower limit of the solution space in *The Flow of Peasant Lives*. Dice outcomes are assumed to be unfavorable to the household team in every round. This strategy depends on welfare and other government payments, uses minimal labor, and does not pawn the cow (savings). L = labor; M = money. (B) Dynamics of capacity reproduction resulting from the strategy shown in (A). Capacities decrease over time but do not collapse. The horizontal axis shows the sequence of rounds.



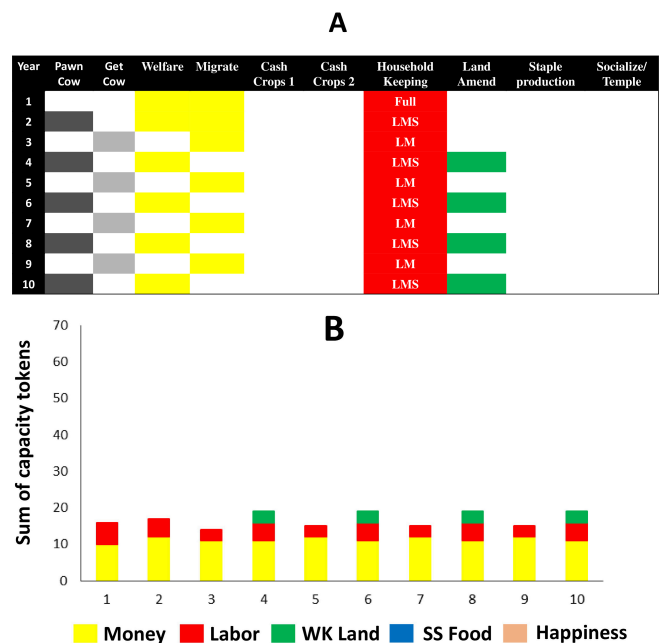
## DISCUSSION AND CONCLUSIONS

The results we have presented show that TFPL is capable of simulating different strategies and trajectories in the livelihoods of RHs. The game's solution space allows for RHs' capacities to increase, decrease, or remain essentially constant. Peasants from the TRUW who participated in TFPL workshops confirm that these dynamics closely represent their life experiences or those of other RHs. Information and insight that we have gained over 15 years of close interaction with different types of actors in the TRUW were indispensable to designing and parameterizing a game capable of representing their social reproduction dynamics. As a result, TFPL is a viable research tool for qualitative simulation, via multidimensional and intertemporal maps, of the principal long-term dynamics and consequences of peasants' social reproduction strategies. Data obtained from such simulations may complement and transcend static images produced by many theoretical and descriptive studies of rural life.

Our research tool differs from models of five types of capital (natural, human, social, financial, and physical) that have become the main focus of the rural livelihood framework, as well as from microeconomic accounting models that have prevailed in designing strategic games oriented toward maximizing resources and making decisions based on rational choice approaches. TFPL seeks to represent the social reproduction conditions of peasant life, including their natural and agricultural heritage, cultural roots, subjectivities, and forms of organization, as well as the

social fields (markets, public policies, development agendas) in which they are immersed. We aimed for RHs to see their life conditions captured through this game and to explore with them the difficulties they face and their opportunities to improve their lives based on their capacity to develop different livelihood strategies and trajectories.

**Fig. 11.** (A) Simulation of a single-family strategy resulting in an outcome in the lower limit of the solution space in *The Flow of Peasant Lives*. Dice outcomes are assumed to favor the household team in every round. The household team pawns its cow (savings), uses an intermediate level of labor, and combines welfare and other government payments with sporadic migratory labor. L = labor; M = money; S = supplying food for family consumption. (B) Dynamics of rapid capacity reproduction resulting from the strategy shown in (A). Capacity levels oscillate noticeably while remaining low. The horizontal axis shows the sequence of rounds.

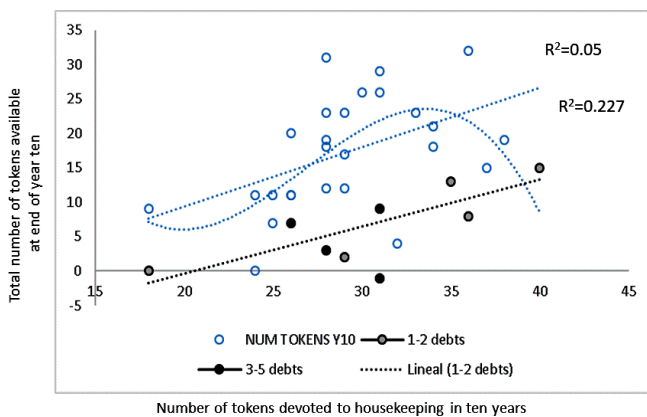


Results of the single-family session show that different RHs follow different livelihood strategies and lead the game along contrasting trajectories of capacity reproduction. These results of implementing the game concord with anthropological research that we are carrying out in the TRUW, in which we document how, in this peasant region as in many others, processes that lead to differentiation of living conditions among RHs are improving the livelihoods of some while others barely manage to ensure minimal living conditions.

In addition to the historical agrarian structure of the region and the means of production exacerbate internal economic differences among peasant families, an aspect not incorporated until now in TFPL, the game succeeds in affirmatively reflecting the different strategies for social reproduction and the ways in which the RHs relate to multiple external agents that drive the rise, maintenance, or fall of their capacities. We observe that the conditions for real life social reproductive success of families in the TRUW region

have to do with a shared history of favorable international migration and productive multifunctionality. The latter includes livestock production, cash crops, and crops for self-sufficiency, benefits from major government production programs, and participation in agroforestry projects promoted by nongovernmental organizations. Contrastingly, the families who are only able to use agricultural production as a means of self-sufficiency, who are employed as rural day-laborers within the same region, and who depend deeply on the government's social assistance programs are those who face limiting social reproduction conditions.

**Fig. 12.** Linear and polynomial regressions for the relationship between the total number of tokens devoted to housekeeping by household teams over 10 rounds and the total number of tokens of all types obtained by the household team over 10 rounds for single-family games.  $N = 44$  household teams; blue data points are for household teams that did not request loans.



Another significant aspect of TFPL is that it transcends the vision of individual-player games (peasants, mostly men, as solitary agents) by defining the domestic group (HT) as the basic player unit, which promotes negotiation within families. Although members of a rural family live under the same roof and share many resources and capacities, we do not conceive them to be homogeneous with respect to their interests and levels of participation. Rather, family members continually deliberate and make agreements with each other (de Haan and Zoomers 2005). During the single-family sessions, we observed that TFPL can be highly effective in promoting “substantive cooperation” (García-Barrios et al. 2008) among family members. That is, the HTs’ decisions and deliberations involve their historical rootedness, community norms, relationships of trust and love, and capacity for strategic evaluation that are typical of peasant societies undergoing continual transformation.

In terms of interfamily and intracommunity cooperation, TFPL is a research tool capable of generating significant analytical results as well as facilitating dialogue. For example, during the multifamily session in the TRUW, HTs felt uncomfortable when invited to cooperate with their peers, which was completely contrary to our initial expectations of natural spontaneous cooperation among RHs. Analysis by HTs regarding the difficulties of cooperating, as captured in Table 1, concurs with amoral familism analyzed by Banfield (1958) for rural Mediterranean societies, characterized by superiority of the

family as an institution of individual interest and internal support over broader social structures such as the community; procuring the interest of the collective only if it brings some personal advantage; and damage to the family’s social status if internal family problems, especially economic difficulties, are publicly manifested. In addition, most interactions among HTs during the game were dyadic social relations (Foster 1961): exchanges between two families (not collective or communitarian) or exchanging one type of capacity for another, either simultaneously or mediated by some type of short-term contract. Such exchanges express low levels of cooperation, which may be an incipient step toward reciprocity.

Despite low levels of cooperation among HTs, such interactions contributed to decreasing the proportion of livelihood trajectories that collapsed from 25% in the single-family session to 7% in the multifamily session. Although this decrease may have been attributed to experience acquired by HTs during the first session (a trivial cause), it is notable that we imposed game restrictions during the second session, deliberately seeking to offset previous learning. The decrease in collapse of trajectories as a result of the few social interactions among HTs concurs with investigations that propose that in situations of high marginalization and poverty, even small acts of reciprocity play a central role in rural family survival (de Lomnitz 1975, Robison et al. 2003, Bakker and Silvey 2012). Therefore, we feel it is important to further explore TFPL as a tool for fostering social learning regarding the importance of reciprocity in rural contexts.

One final notable attribute of TFPL is its immanent participatory approach to social learning, rather than using an interventionist approach based on outsiders’ preconceived ideas of how to represent and improve rural livelihoods (Morse and McNamara 2013). TFPL leads HTs to reach their own conclusions regarding how to improve their livelihoods over the course of the game (García and Speelman 2017) as they analyze consequences of their previous decisions regarding the use of their capacities in the face of uncertainty and power asymmetries. The more evident the connection between the game’s scenarios and the participants’ context and experiences, the more effective and relevant the resulting social learning will be (Barreteau et al. 2003, Étienne 2014). As Bebbington (1999) and Devereux (2001) have noted, fostering self-perception by marginalized RHs is fundamental for them to be able to improve their livelihoods. It is encouraging that some TRUW families say that playing TFPL is like being in front of a mirror that makes one’s everyday practices explicit in a setting in which families can strengthen their virtues while safely exploring and modifying some of their limitations at low social cost.

As a research tool, TFPL is a social simulator that combines nomothetic and ideographic research methods (Gilbert and Ahrweiler 2006). The nomothetic aspect of TFPL consists of a highly abstract model that captures key factors common to social reproduction of most RHs around the world: peasant balances (van der Ploeg 2013), arenas and interfaces of action (Long 2003, Ostrom 2005), navigating fields of social power in which the household is immersed (Bourdieu 1990), and connections among a household’s different resources and capacities. By contrast, the ideographic aspects of peasants’ lives that TFPL represents are quite specific to the TRUW context and regional history and include agriculture, forms of migrant labor, payments by poverty

reduction programs, the role of church attendance, use of cattle as family savings, and aversion to borrowing money at usurious rural rates.

In summary, we believe that TFPL is a viable research tool with high heuristic value. It has considerable potential to be adapted to many contexts worldwide by modifying its mechanics and time frame of capacity reproduction, and rearranging components of the game board. Of course, successful adaptation to another location will require thorough knowledge of the local reality to parameterize the game effectively. The resulting game would need to be explored by the research team to compare its range of trajectories with those observed in the region, as well as with the peasants to ensure that they identify with the game, and the adapted version must be capable of catalyzing social learning processes.

We are currently analyzing the capacity of the game to promote imagination and social change through the single-family session with changes in critical parameters that are socially defined by other actors (production costs, product prices, risk level, and other factors). This analysis will be discussed in a later paper, which will elucidate how micropower, gender roles, and intergenerational gaps influence peasant societies' visions of rural life transformation and how changes proposed by HTs modified game results. We also hope to develop an interactive computer platform for TFPL with simple instructions to facilitate adjusting game parameters to diverse rural contexts. The interactive version would also include postsession questionnaires, a chat for players, and automatic recording of decisions and counting of tokens. Several studies (Barreteau et al. 2001, Gilbert and Troitzsch 2005, Janssen et al. 2010, Poteete et al. 2010) show that such platforms facilitate the capability of research to develop systematic analysis with a broader scope.

Responses to this article can be read online at:  
<https://www.ecologyandsociety.org/issues/responses.php/11723>

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#### Data Availability:

Data/code sharing is not applicable to this article: no new data/code were created or analyzed in this study.

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