



State of Land in the Mekong Region

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[Editor's Note: This article is a brief snapshot of the full-length publication, just recently published and made available. The full-length book can be found and downloaded free online at the [Mekong Region Land Governance \(MRLG\) website](#), and we would encourage you to take advantage of this great resource. For further information, please contact the authors: micah.ingalls@cde.unibe.ch or jc.diepart@gmail.com]



Photo Credit: Justin Mott

The Mekong region lies at the intersection of Southeast, East and South Asia, between two Asian giants: China and India. It comprises five countries that host the bulk of the Mekong river watershed: Cambodia, Lao PDR, Myanmar, Thailand and Vietnam. The Mekong region is exceptional for its social and ecological richness. Home to 237 million people, the region includes 329 ethnic groups speaking 410 distinct languages, making the region one of the most ethnically-diverse in the world. The Mekong is also a global biodiversity hotspot, with a high degree of ecological and agricultural diversity.

The Mekong region has undergone rapid socio-economic growth over the past two decades alongside pronounced transformations in a number of key sectors. These changes have significantly altered relations between the rural majority and increasingly-affluent urban centres. Land—as both a foundation for national development and the livelihoods of millions of rural and agricultural communities—continues to play a central role in the Mekong region. In all five countries, smallholder farmers play a crucial role

in the development of the agricultural sector and, through it, food security and economic growth. However, rural communities are being increasingly swept up into regional and global processes within which they are not always well-positioned to compete. Worse, they are often undermined by national policies that fail to ensure their rights or enable them to reap potential benefits.

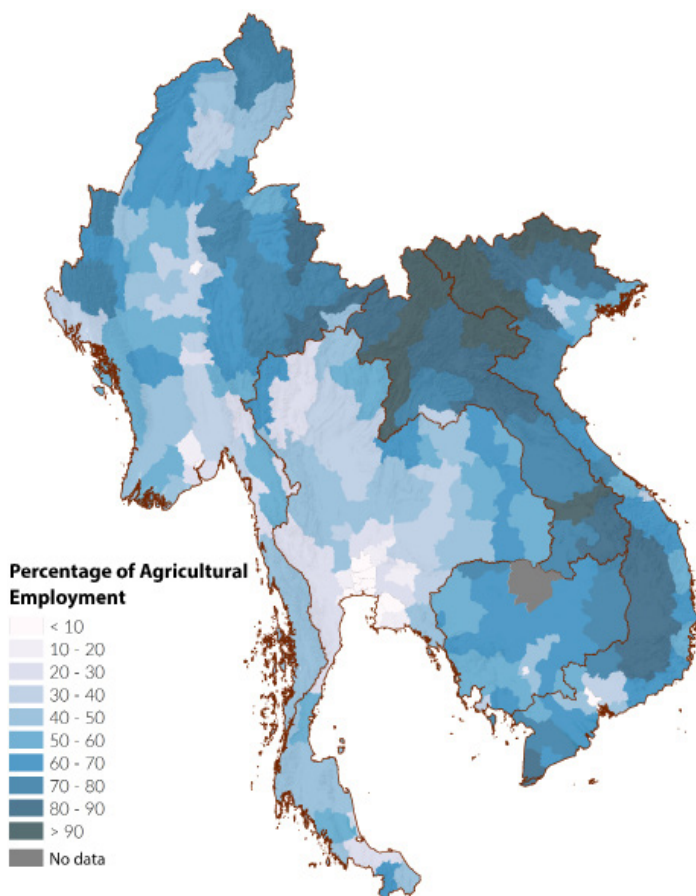
Understanding the changing role and contribution of land to development is critical to inform policy, planning and practices toward a more sustainable future. *The State of Land in the Mekong Region* aims to contribute to a much-needed conversation between all stakeholders by bringing together data and information to identify and describe the key issues and processes revolving around land, serving as a basis for constructive dialogue and collaborative decision-making. *The State of Land in the Mekong Region* is structured around five domains: (1) the land-dependent people of the Mekong, including dynamics of rurality, agricultural employment and the on-going structural processes of demographic and agrarian transition; (2) the land resource

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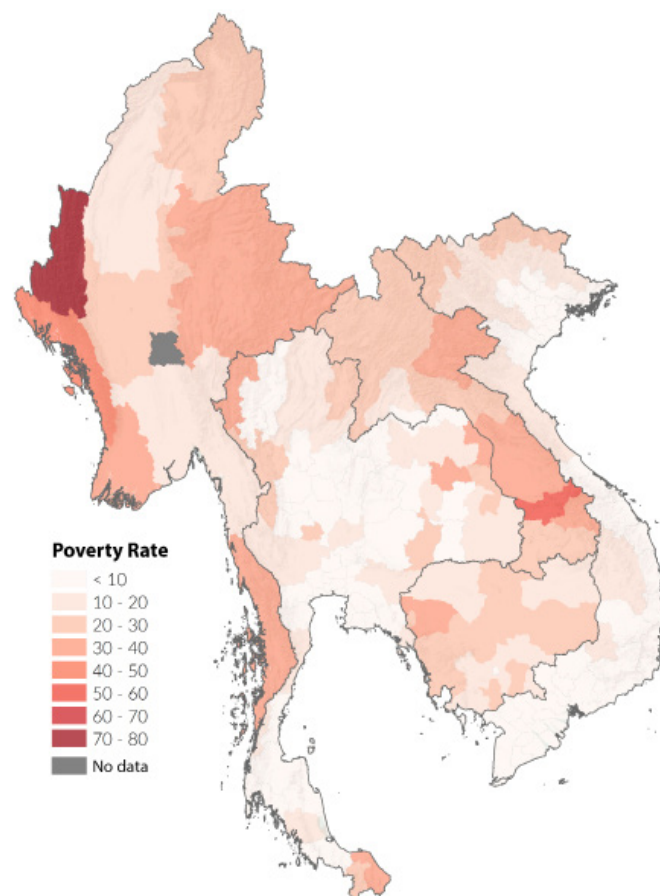
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Map 1: Proportion of population engaged in agriculture, by province
Source: national census data, see full report



Map 2: Poverty rates, by province
Source: national census data, see full report

base upon which this population depends, including land use and land cover, agricultural conditions and change, and the region's natural capital; (3) the ways in which this land resource base is distributed across society, including smallholdings, large-scale land investments and other designations;

(4) the security of land tenure, which depends on how land rights are recognized and formalized, and; (5) the conditions of governance and land administration that shape access to and control over land resources, including issues of transparency, equity, the rule-of-law and access to justice. *The State of Land in the Mekong Region* is framed by a number of key indicators within each domain and presents these on two levels. At the regional-level, it presents a comparative analysis of key indicators between the Mekong countries and an examination of transboundary process that shape and define land issues, including regional trade and investment flows in the land and agricultural sectors. At the country-level, data and information on key indicators are disaggregated and examined to

identify country-specific conditions and trajectories of change.

The role that knowledge plays in the identification of key land issues and in structuring decisions and policies to address these is critical. Yet, information on land and natural resources is often lacking, inconsistent, contested and difficult to access. The *State of Land* thus provides a critical analysis of data and information—what is available in the public domain, what is not, and why these matter—with a view toward constructively identifying ways to improve the production, management and sharing of data and information.

Each country in the Mekong region is undergoing a structural transformation of its economy, generally moving away from agriculture as its dominant sector. While the agricultural sector continues to grow—in some cases impressively—its proportional share of Gross Domestic Product has declined due to the even-more rapid growth of their industrial and service sectors. This pattern varies significantly across countries, however. In Thailand and Vietnam, urbanization and

industrialization are more advanced; the share of agriculture in GDP is lower and has been more or less constant over the last 25 years. In Cambodia, Laos and Myanmar, the share of agriculture in GDP is higher, but saw an important drop from 2010 to 2016 to 26.7, 19.5 and 25.5 percent, respectively.

The proportion of the population engaged in agriculture has also declined, but at a much slower rate and still remains relatively-high (e.g. 80 percent in Laos and 70 percent in Vietnam, though 30 percent in Thailand) (Map 1). This and other evidence suggest that the agrarian transition—the transformation of agriculture under the forces of urbanization and industrialization—is an uneven process that is far from complete in the Mekong region. In Cambodia, Laos, Myanmar and Vietnam, the creation of jobs in the secondary and tertiary sectors lags significantly behind growth of the active labour force in rural areas, meaning that agriculture remains a strategic job provider for the vast majority of the rural population. Thus, access to land remains a central concern in the livelihoods of rural communities. This rural and agricultural population is also most likely

to be poor. Poverty rates have been steadily declining across the Mekong, but this is much less true for rural areas (Map 2). Ninety percent of poor households in Cambodia, for example, are rural. In Thailand, the differentiation is perhaps more striking: while only one-third of households are considered rural, these comprise 80 percent of Thailand's poor.

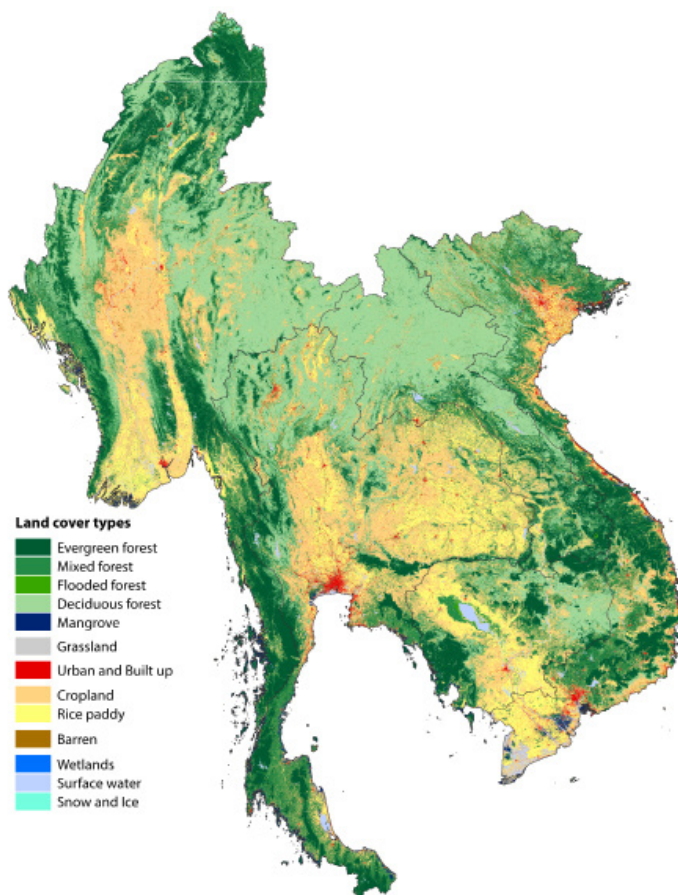
The incomplete character of the agrarian transition is increasingly visible in the demographics of the Mekong countries—in particular in the mobility of the rural population. Rural-to-urban migration flows are important, and related to urbanization and the opportunities afforded by growing industry and service sectors. However, these rural-to-urban migrations are dwarfed by the outsized flow of people from one rural place to another in search of land and economic opportunities, a dynamic typically under-recognized in the region. This rural-to-rural mobility has important implications for land distribution, access and tenure security. Cross-border migrations are both rising and typically associated with rural communities, as workers—especially the young—leave agricultural communities in Cambodia, Laos and Myanmar

in search of employment, commonly in Thailand.

These economic and demographic transformations have been accompanied by dramatic changes in land use and land cover in the Mekong. At present, forests dominate the Mekong region (Map 3), comprising 47% of total land area (around 88.4 million hectares, ha) while agricultural land accounts for nearly 30% of land (or 54.4 million ha). This is rapidly changing. Agricultural land across the region increased by more than 9 million hectares, or around 20 percent, between 1996 and 2015. At the same time, forest areas have declined, as non-forest uses (especially agriculture) encroach into remaining natural forests. These changes vary considerably by country. Vietnam has seen the most impressive expansion of agricultural land (around 65 percent), similar to patterns of agricultural expansion in (in descending order by proportion) Laos, Myanmar and Cambodia. Thailand, by contrast, experienced little change. Declining forest areas have been most pronounced in Cambodia and Myanmar, which have lost 22 and 21 percent of their forests, respectively. The expansion of agricultural land has also

been accompanied by a number of changes in cropping patterns. The significant increase in the cultivated area of export-oriented commercial crops has resulted in a degree of diversity at the aggregate level, where cropping has partially shifted away from the overwhelming dominance of rice to include commodity crops. However, the replacement of natural vegetation and local, diversified cultivation systems has also brought about a profound degree of simplification: six crops alone—rice, cassava, maize, sugarcane, rubber and oil palm—now command fully 80% of all agricultural land in the Mekong. However, these crops are distributed unevenly (Maps 4-8).

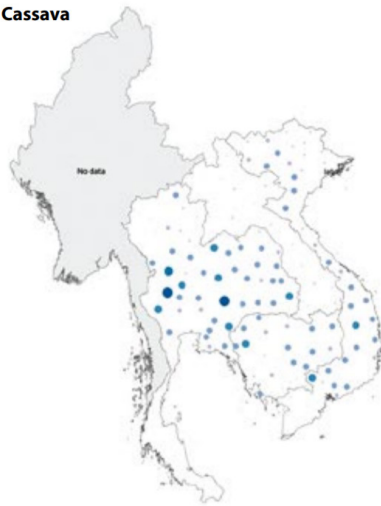
The crop diversity index (Map 9) provides a disaggregation of the diversity of cultivated species, proportional to their area of cultivation, at the subnational-level ranging from low diversity (near 0) to high diversity (near 1). The intensification of agricultural production is another pronounced trend and, while playing a major role in the growth of the agricultural sector, also has important implications for land degradation. Evidence suggests that the majority of the region's



Map 3: Land use and land cover in the Mekong region
Source: SERVIR Mekong



Cassava



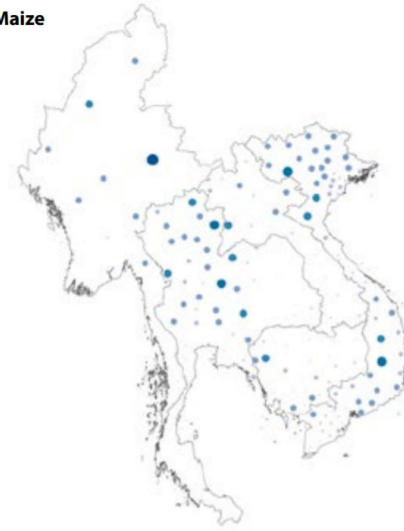
Rubber



Oil palm



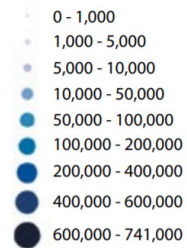
Maize



Sugarcane



Crop area in ha



Maps 4-8: Distribution and area of boom crops in the Mekong

Source: national agricultural census data and concession data, see full report

land area shows medium- to high-levels of degradation, resulting from the loss of natural vegetation, mono-cropping, poor soil conservation technique and cultivation on fragile and easily-erodible soils in upland areas. The erosion of the natural capital base is a pressing concern with both immediate and long-term effects, particularly for those whose reliance on agriculture and forest resources—the poorest segment of society—is most direct.

Agricultural land in the Mekong countries is primarily under the management of smallholder farmers, who thus remain the most important segment of the rural population with regard to the management of land, despite the increasingly-visible role played by agribusiness corporations and investor. However, agricultural land is unequally distributed among these smallholder farmers. The average landholding size per agricultural household varies widely between countries, from 0.7 ha in Vietnam to 3.1 ha in Thailand. Except in Laos, the average area of landholding per agricultural household has declined over the last 10 years. Variation in land holdings within each country is larger than variations between countries. The Gini Index of the

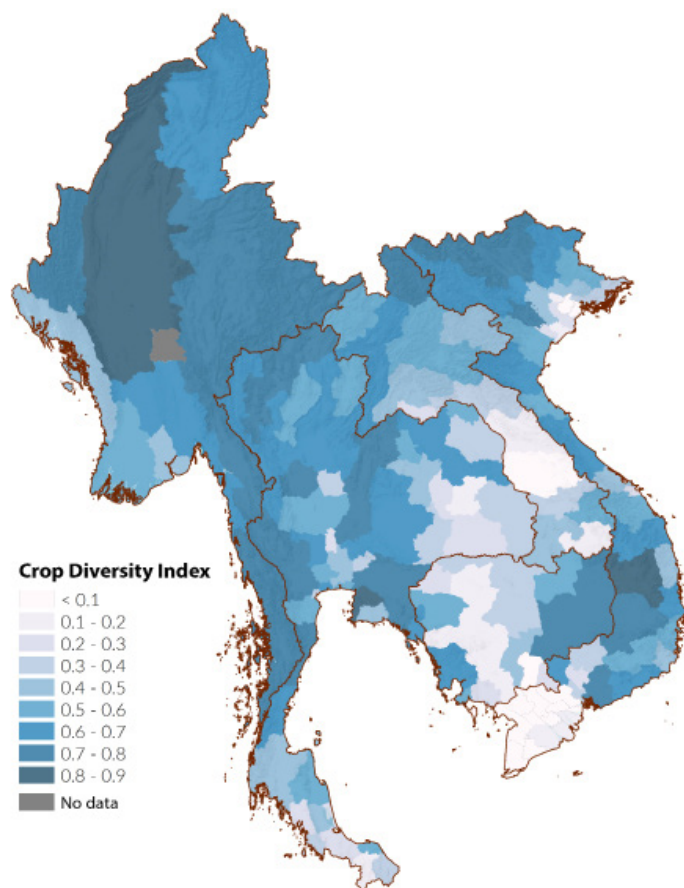
distribution of smallholder agricultural land is relatively high (Cambodia: 0.47; Laos: 0.34; Myanmar: 0.48; Thailand: 0.49 and Viet Nam: 0.54) and has tended to increase in all five Mekong countries.

Map 10 provides a disaggregation of the land Gini Indexes at the subnational-level. In these figures, landlessness is not adequately captured due to a lack of systematic data. Case studies indicate that the inclusion of landless households would demonstrate even higher disparities in land. Importantly, the inclusion of large-scale agricultural and forestry concession operated by companies shows that the distribution between all landholders is even more uneven (with Gini coefficients in Cambodia of: 0.64; Laos: 0.49; Myanmar: 0.53; Thailand: 0.49 and Viet Nam: 0.56).

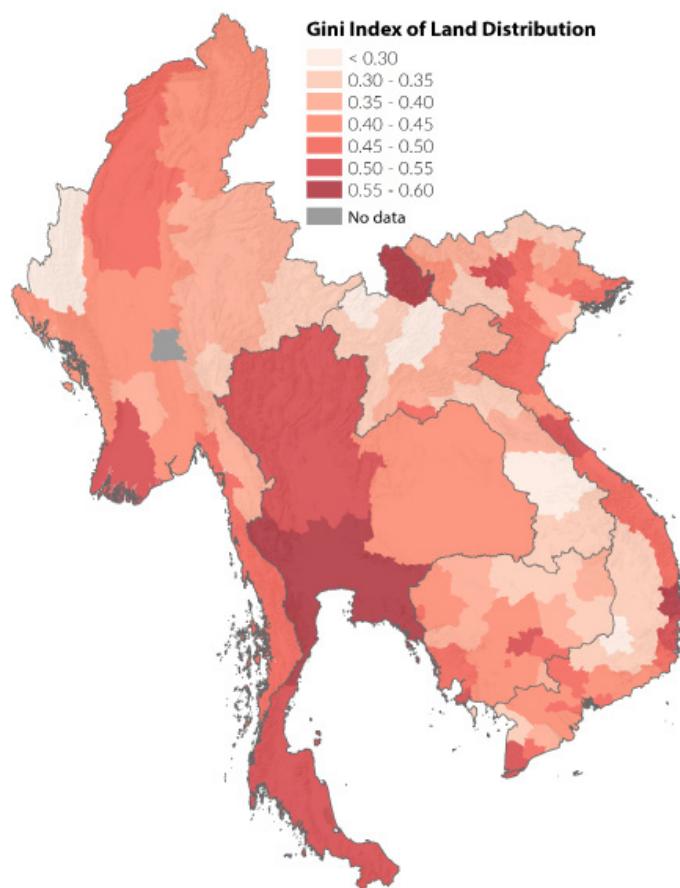
With the exception of Thailand, there has been a pronounced trend in all Mekong countries since the late-1990s toward an increasing number of large-scale land investments, as the governments of the Mekong countries have sought to leverage land deemed under-utilized to attract financial resources for development. The rationale is presented as self-ev-

ident: granting concessions in exchange for financial investment is necessary to turn untapped land into capital, boost the production of export commodities and stimulate opportunities for local development such as wage-labour, rural infrastructure, processing facilities and access to markets.

Though some occurred earlier, large-scale land investments in the Mekong took off around 2006, and were further stimulated by the global financial crisis (2008), as rising food- and fuel-costs and risks associated with financial markets prompted global investors and agribusiness companies to invest in the Mekong's emerging land market. Until 2011, the granting of land concessions was in full-swing (Figure 1). As a result, the agrarian structure of the Mekong countries has been considerably transformed. In total, 4.1 million hectares of land have now been granted to companies under various concession agreements in the agriculture and tree plantation sector alone. In Cambodia, Laos and Myanmar, land concession areas represent, respectively, equivalent to 37, 30 and 16 percent of the total area cultivated by smallholder farmers. Concessions of land in the mineral sector are



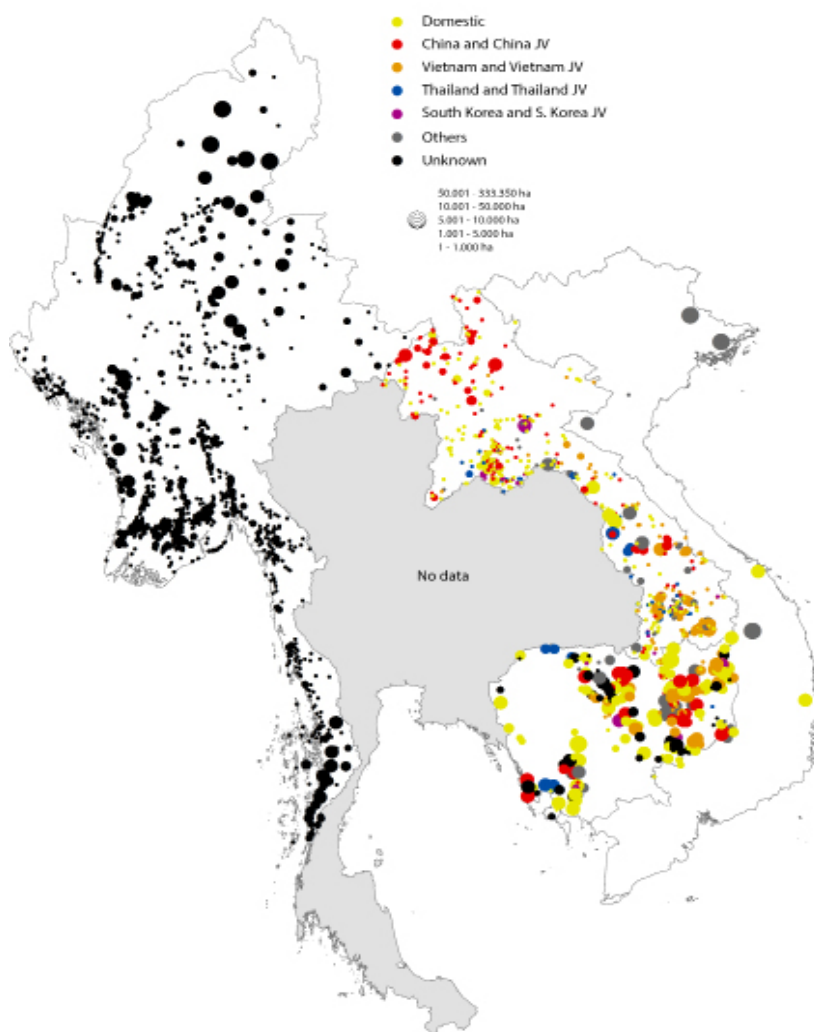
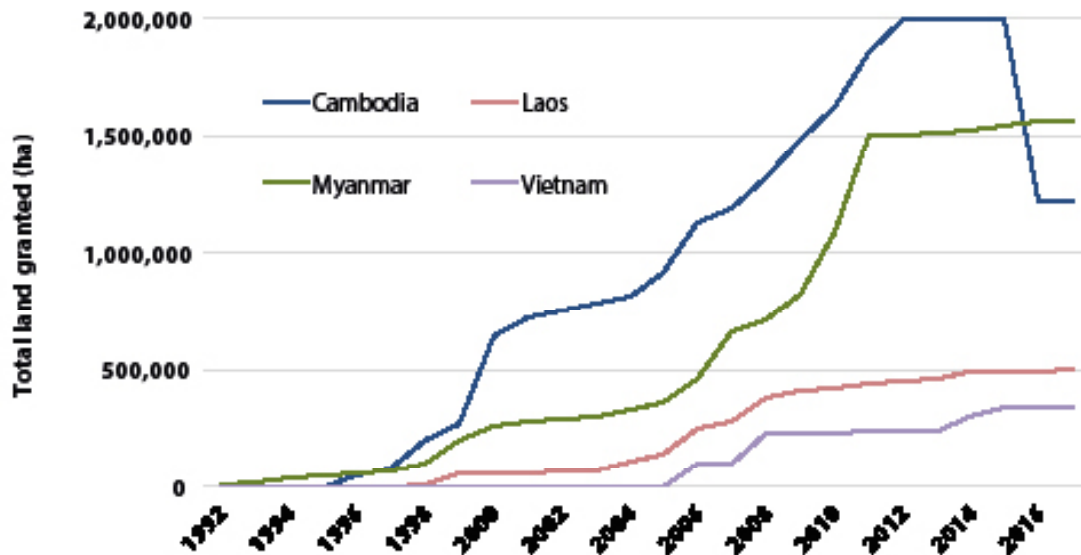
Map 9: Crop diversity index, by province
Source: national census data, see full report



Map 10: Gini Index of smallholder agricultural land distribution, by province
Source: national census data,

Figure 1 : Area under agriculture and tree-crop concessions, over time, in the Mekong

Sources: Multiple, see full report



Map 11: Agriculture and tree plantation concessions, by investor country

Sources: multiple, see full report

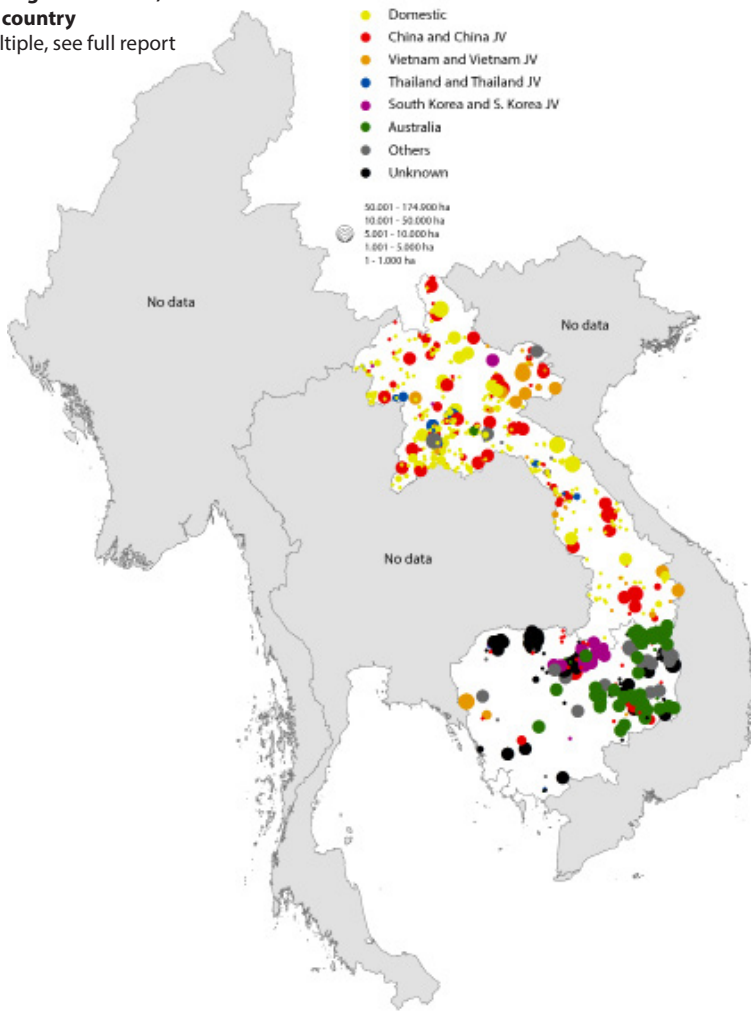
substantial and, including exploration concession areas, significantly outsize agriculture and forestry concessions with at least 10 million ha. With the exception of Laos, a lack of available data limits detailed assessment.

Most of the area under agricultural concession is devoted to the boom crops—rubber, sugarcane, oil palm, cassava and maize—that represent 76 percent of concession areas across the region. An important dimension of the concession landscape in the Mekong is the transboundary nature of investments and associated trade-flows between the Mekong countries themselves and their near-neighbours (Figure 2). While a significant amount of investment in land concessions is driven by domestic investors (43 percent in Cambodia and 31 percent in Laos), the second largest group are outward-going investors from China, Vietnam, Thailand and South Korea (together accounting for 36 percent of total concessions in Cambodia and 60 percent in Laos) (Maps 11 and 12). Vietnam and Thailand function both as investors in large-scale land deals and importers, processors and exporters of the commodities associated with them. China is, by far, the largest end-market for regional exports of agricultural commodities (Figure 2).

In the main, the hoped-for benefits of these land investments have not been realized. While playing a role in rising GDP in host countries, state revenue has been less than anticipated and the social and environmental costs of these developments have generally exceeded their benefits. These costs have largely been borne by the rural poor. Fundamental to the problem has been an under-rec-

Map 12: Mining concessions, by investor country

Sources: Multiple, see full report



rity of their tenure. Land titling and land use certificates are considered principal ways to provide formal legal recognition and to serve as collateral for loans. Land tenure formalization is most advanced in Vietnam, Thailand and Myanmar, though in the latter two of these countries titling tends to exclude large parts of the forest estate, a situation found also in Laos.

Beyond the titling of individual parcels, existing legislation and policies of the Mekong countries offer various forms of recognition of customary tenure.

Despite supportive legal frameworks, the practical formalization of customary tenure recognition has been slow, weak and irregular. The situation is particularly problematic in Myanmar where legislation has been generally regressive, providing no clear legal protection for customary tenure in, for example, shifting cultivation systems. Alternatively, a variety of co-management arrangements have been used across the Mekong as mechanisms to support traditional claims over land, forests and fisheries.

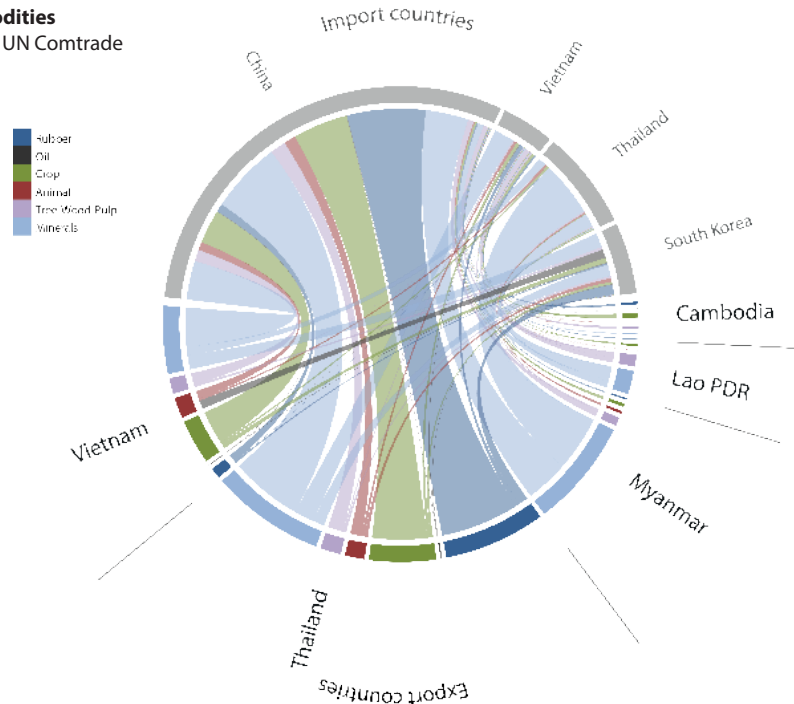
In response to structural changes in the land and agricultural sectors and the rapid changes in investment and commodity-flows brought about by the globalization of financial- and market-systems, the governance of land resources in the Mekong is undergoing a period of transformation previously unseen. The environmental and social impacts of large-scale land acquisitions and the rapid growth of land markets have trig-

ognition of land tenure and local uses prior to acquisition. The dispossession of rural households from land concession areas accompanied by inadequate compensation—where such has been provided at all—has had a particularly negative impact, clearly at odds with the stated purposes of concession-based development strategies. The lack of return on these investments has prompted concerns among policy-makers across the region. In 2012, Laos and Cambodia both issued limited moratoria on new concessions. Processes of land conflict resolution have been activated but a particular point of concern in Cambodia, Laos and Myanmar revolves around the cancellation of concessions that are not performing or meeting their obligations. The underlying questions is whether these areas will be maintained as State land or be redistributed to farmers and communities. The tensions are clearly palpable and the future of concession-based development is uncertain.

The well-being of smallholders and their ability to gain benefits from their agricultural land depends to a large extent on the secu-

Figure 2: Trade flows for land-intensive commodities

Source: UN Comtrade





gered social unrest, raising concerns among policy makers resulting in—in some cases—policy responses such as moratoria (above), improved environmental and social impact assessment and compensation processes, and the prioritization of high-quality investments (those with relatively better social and environmental performance). Alongside these policy and regulatory changes, what has been

These changes include both a degree of opening as well as a degree of closure, often in the same countries. In addition to a general lack of rights for civil society in some of the Mekong countries, of particular concern has been the recent clamping-down on such groups, often in response to political changes and uncertainties surrounding public corruption and land-related investments.

most pronounced across all Mekong countries is the large gap between these and the practice of land administration. Corruption and a lack of public accountability remain key obstacles to addressing critical problems surrounding the land issue. The expropriation of land by the state for the promotion of investments has continued to struggle with the ambiguous nature of some specific land-deals—deals promoted for public purpose but often developed for private benefit. Closely related to these issues, the past decade especially has seen significant changes in civil society in the Mekong and the degree to which civil society organizations are able to effectively address land-related issues.

The rights of indigenous peoples and ethnic minorities to land and other resources vary widely across the Mekong. While national legislation in each country commonly includes provisions to ensure their rights, such provisions have generally not been sufficient to enable indigenous peoples and ethnic minorities to defend land claims or to protect traditional practices, such as shifting cultivation. Similarly, while the rights of women and female-headed households are typically enshrined in legal frameworks, there remains a need for significant improvements with regard to their protection in practice. A lack of gender-disaggregated data and information on tenure security for women is a key obstacle to consistent monitoring.

The Mekong is in the midst of substantial, far-reaching transformations with regard to land. The region is thus at a critical juncture wherein robust, inclusive and accountable decision-making are urgently needed. The continued dominance of regional and global financial- and commodity-markets suggests that the direction the Mekong countries take with regard to key land-related issues will be shaped in some measure by outside influences. The path forward depends on the degree to which these forces can be leveraged for the benefit of the rural and agricultural majority, rather than for the few. Whether the region is able to steer a course toward a more sustainable and inclusive future remains an open question, the answer to which will decide the future of the land and the people of the Mekong.



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Highlighted Resources from the ECHO Asia 'Small-Scale: Up-Scale' Agriculture & Community Development Conference

by Elizabeth Casey¹

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[Editor's Note: In the event that you were unable to join us for this year's ECHO Asia Conference, we have summarized and made available some of the materials presented. Highlighted below are some of the presentations and materials that received significant positive feedback from our participants, followed by links to all additional talks and resources shared during the week.]



This year's 7th Biennial ECHO Asia Agriculture & Community Development Conference took place in Chiang Mai, Thailand 1 - 4 October, 2019. This four-day event was full of practical information relating to sustainable agriculture and community development in the region. We are thankful for the many practitioners (from 28 countries) who gathered to present their expertise, share ideas, swap seeds, and enrich each other through networking! Let us share with you some highlight workshops from this year's conference. Resources on our [ECHOcommunity.org](https://www.echoasia.org/echocommunity.org) website are hyper-linked throughout this article, so please let this article serve not only as a window into this year's conference, but also as a gateway to more practical information.

Black Soldier Fly (BSF) Larvae Production

Wong Kim Hooi (Anthony) of Frangipani Hotel & Resort taught a workshop titled "Black Soldier Fly Larvae for Chicken Feed." He shared that recycling food waste is still fairly limited, while 40% - 60% of landfill content is food waste. Black soldier fly larvae can be



Figure 1: Mr. Anthony Wong sharing the benefits of BSF at the ECHO Asia Conference 2019.

used as a viable, high lipid biomass feedstock, produced using organic matter (animal manure, restaurant waste, and fermented straw). The larvae have received attention for their ability to quickly compost materials such as meat and carrion that vermicompost systems avoid. This larvae bioconverts the manure's nutrients into a 42% protein and 35% fat feedstuff and can be fed right back to livestock, fowl, or fish. Larvae can also be ground and fed into vermicomposting or used to pre-digest high cellulose material to then be broken down by worms. Benefits of BSF production include reducing waste from food scraps as well as excess farm animal manure. Adding larvae to animal feeds can also cut a small-scale farmer's costs by reducing the amount of commercial feed they need to buy. Participants were shown how to construct a simple, self-harvesting BSF larvae production system using styrofoam coolers.

Natural Farming

Chris Trump, Soil Specialist with Natural Farming, Co., taught a workshop titled 'Upscaled Natural Farming.' He told the story of how his family farm in Hawaii transitioned from conventional, chemical farming to organic farming. The Trump family farm is 800 acres of certified organic macadamia nut orchard and is farmed using exclusively [Natural Farming](#) methods and compost for their nutrient needs.

During the presentation, the group also discussed the implications of God's design as a commercial farmer. Chris spoke on large scale techniques for tending to the microbial life of the soil. The workshop also explored cost/benefit implications to focusing on the life of the soil. These soil-building techniques include making Indigenous Micro-organism (IMO) solutions by collecting local fungal mycelia from soil at the base of bamboo clumps or other carbon-rich plants.



Figure 2: Mr. Chris Trump conducting a Natural Farming workshop at the new ECHO Asia farm.

This and other solutions are then used as foliar sprays and soil drenches to encourage the soil microbial population in a farming system. Chris and his family have been more profitable with Natural Farming techniques in the last 3 years (they have been using them for 9 years now) than in the last 28 years combined. Over 40 conference participants attended and got an up-close, practical look at natural farming techniques. They also engaged in discussion with an extended Q&A time to explore a revolution sweeping the agricultural world.

Sloping Agriculture Land Technology (S.A.L.T.)

Jethro Adang, Director of the Mindanao Baptist Rural Life Center, taught on Sloping Agricultural Land Technology (S.A.L.T.). This diversified farming system involves planting perennial hedgerows along the contour lines of a hillside to combat soil erosion with a succession of perennial and annual crop production in between hedgerows. The title of his presentation was "[Two Versions of SALT Technology, 1. Sloping Agriculture Land Technology - 2. Simple Agro-livestock Technology](#)." This session gave participants an understanding of the current need for SALT technology for erosion control, soil moisture retention, environmental and soil



Figure 3: This SALT diagram can be found at: <http://bgri.org/resources/sloping-land-agricultural-technology/>

fertility restoration, and increasing production in highland agricultural areas. This technology also saves labor and increases income for the small-scale farmer. Jethro shared ten steps in making and maintaining a S.A.L.T. farming system, including how to build a simple A-frame to measure contour lines and selecting what leguminous forage perennials to use as hedgerows. Most of the time, crop production and animal backyard raising are integrated in order to meet the economic needs of rural farmers. Fittingly, this system can incorporate livestock by establishing animal barns as well as forage gardens based on preference and nutritional needs of the animal. Considerations like livestock management, breeding, and marketing animal products well were also covered. Jethro concluded that the correct technology creates the correct production, and that production helps to uplift the economy of the farmers.

Making On-Farm Feeds for Livestock

Two conference workshops offered practical information and training on making cost-effective livestock feeds using farm-available materials.

Boonsong Thansritong, Agriculture Operation Manager at the ECHO Asia Impact Center, taught a workshop titled, “**Total Mixed Animal Feed Ration (TMAFR): Pig and Poultry.**” This workshop was given in English with Thai translation. Animal feed represents 70% of the costs involved in modern animal production. This creates a significant problem for small-scale farmers as it allows for very little profit margin. This workshop explored methods to reduce this expense by using feed ingredients easily grown on a small farm, such as banana

stalks. Participants learned the importance TMAFR, its key ingredients, and how to use it for pig and chicken feed. Participants were also shown results from ECHO Asia’s recent research on **Farm-Generated Pig Feed** that compared weight gain in pigs raised on commercial feed vs. an on-farm feed made weekly with a base of fermented banana stalks and additives such as rice bran, corn meal, fish meal, and soy meal. On-farm feeds were found to be more labor-intensive, but a financially feasible option for farmers, especially for those in remote places where commercial feeds costs are more expensive or challenging to source. The experiment showed that bringing a pig to market weight using on-farm feeds can contend economically with doing so using commercial feed, and can be made more adoptable with added farm-available resources. Conference workshop participants worked together to produce TMAFR, using the ECHO farm pigs and hens as a case study to demonstrate the benefits of this feed.

Keith Mikkelson, Director of Aloha House, taught a workshop on economical livestock



Figure 4: ECHO Asia staff demonstrate their process for making on-farm feeds.

feed options. He is the author of ECHO’s newest publication, “*Animal Integration & Feeding Strategies for the Tropical Smallholder Farm.*” This book was born out of a compilation of past ECHO Asia Note articles discussing on-farm feed solutions for his farm in Palawan, Philippines. ECHO Asia Notes featured his articles on **Farm-Generated Chicken Feed**, **Feed Options for Ruminants in the Tropics**, **Hog Feed Production**, and **Fish Feed Production**. This resource is also highlighted in **ECHO Asia Note #39**.

Seeds

This year’s conference also offered a variety of workshops from ECHO staff and partners from Global Seed Savers in the Philippines. These sessions focused on different aspects of seeds, including seed storage techniques and seed banking strategies.

ECHO Asia’s Seed Bank Manager, ‘Wah’, offered a workshop titled ‘**Seed Cleaning**,’ which took place on the ECHO Asia Farm during one of the afternoon workshops. She demonstrated that seed saving is still an important practice for small-scale farmers. Each crop is unique, and therefore each seed needs to be cleaned in a different way. In this workshop, Wah shared her years of experience cleaning and saving seed of neglected and underutilized edible crop varieties that are important to SE Asia. She covered seed cleaning methods such as fermentation, massage, hitting, sand treatment, screen cleaning, and blending.

ECHO Asia Seedbank staff member, ‘Paw’, taught on ‘**Seed Viability Testing**.’ Viable seed is crucial to the success of small-scale farmers, and can save a farmer significant costs up front. So, where seeds are cleaned and saved, it’s important to ensure the germination quality of those seeds. Paw demonstrated techniques to evaluate seed viability through germination testing methods. Each seed has unique biological characteristics, and therefore needs a unique method of germination testing. The workshop surveyed many useful seed viability testing techniques such as using soil, petri dishes, sand, cotton, and bamboo. Participants were also invited to gain hands-on experience setting up a paper towel germination test in which seeds are sanitized, wrapped in a moist paper towel, and stored in a plastic bag.

ECHO Global Seedbank Manager, Holly Sobetski, offered a workshop titled, ‘**Teaching Seed Saving to Diverse Audiences.**’ This workshop looked into how to best teach and equip various audiences, for example rural farmers, development workers, seasoned professors- or all three at the same time! Holly shared



Figure 5: Seeds vary in size, colour, and grow in all types of conditions. ECHO Asia Seed Bank has all of these seeds and many more!

about the importance of trainers taking on a learner's attitude about people they equip as well as the training process itself. This was a time of learning and sharing tips on how to best embrace the diversity a trainer finds not only in seeds, but in the people they train. Content on the basics of seed saving and banking was outlined in order to give participants a starting point to plan and adapt training objectives and activities.

Harry Paulino and Karen Lee Hizola of Global Seed Savers Philippines presented a workshop related to establishing seed libraries. Seed libraries were defined in comparison to other seed-saving operations such as seed banks and gene banks. These libraries offer a community a unique way to engage seed-saving and save important genetic material that contributes to local food security. Participants were shown practical steps and considerations in thinking through plans to establish a seed library that is locally-adapted to suit a community's needs.

For all additional resources from the 2019 ECHO Asia Agriculture & Community Development conference, see the hyperlinked presentations summarized below.

Please take note that this event takes place every two years, with plans for the next ECHO Asia Agriculture & Community Development Conference to happen in October of 2021. Between now and then, the ECHO Asia team will host periodic regional training events, and regular on-farm trainings at the ECHO Asia Small Farm Resource Center in Chiang Mai, Thailand. If you are signed up for ECHO Asia Notes, you will receive announcements for these training events, and we encourage you to pass on any updates to those that could benefit from these gatherings.



REFERENCES

Plenary Presentation Resources:

- [Seed Saving and the Role of Community Seed Libraries in Light of Climate Adaptation](#) - by Karen Lee Hizola of Global Seed Savers, Philippines
- [Principles of Understanding the Farmer](#)- by Jethro Adang of the Mindanao Baptist Rural Life Center
- [Climate Smart Agriculture](#) - by Dr. Julian Gonsalves of the International Rural Reconstruction Institute (IIRR)
- [Upscaling the Integrated School Nutrition Model: Leveraging the Nutrition Contributions of Gardens](#) - by Emily Monville, of the International Rural Reconstruction Institute (IIRR)
- [Dynamic and Innovative Rotational Farming System and Practices in Karen Communities in Northern Thailand](#) - by Dr. Prasert Trakansuphakon of the Thailand Pgakenyaw Association for Sustainable Development
- [Scaling-up for Agriculture and Community Development](#) - by Dr. Eduardo Sabio of ECHO Asia
- [Agriculture Programming to Improve Nutrition: First Evidence, Then Scale](#) - by Cecilia Gonzalez of ECHO Latin America & the Caribbean

Afternoon Workshop Presentation Resources:

- [An Introduction to Earth Building Techniques](#) - by Marco Tosi of Mae Mut Garden
- [Aquaponics: Can it help families be more food-secure in Nepal and elsewhere](#) - by Vernon Byrd of YWAM (Kona Campus)
- [Food Smart Cities](#) - by Hai Hoang Thanh and Lam Nguyen of Rikolto International Vietnam
- [Vetiver Grass](#) - by Grace Gesto of SIL International - LEAD Asia
- [Talking Crap: Exploring Ecological Sanitation for a Sustainable World](#) - by Dan Newns of the Center for Vocational Building Technology (CVBT)
- [Evaluating coffee: How coffee is graded and marked as specialty](#) - by Zachary Price of the Coffee Quality Institute
- [Principles of Regenerative Agriculture, Carbon Sequestration, and Climate Change \(part 1 & 2\)](#) - by Dr. Mark Ritchie of the International Sustainable Development Studies Institute
- [Creation Care](#) - by Dr. David Price of LEAD Asia
- [Mixed Income Models for a Small Farm](#) - by Marco Tosi of Mae Mut Garden
- [Producing & Marketing Value-added Farm Products and Supplement and Tumeric](#) - by Keith Mikkelsen of Aloha Ranch & Organic Farm
- [Agroforestry: "Next generation green revolution" for climate-resilience farming by smallholder farmers](#) - by Bhim Ghaley of University of Copenhagen
- [Profitable Biochar and Styrofoam Cement](#) - by Dr. Michael Schafer of the Warm Heart Foundation
- [Challenges facing the smallholder farmer in Asia: lessons learned from the ECHO network](#) - by Patrick Trail of ECHO Asia

Research Update: Uptake of Heavy Metals in Tire Garden Planters

by Gabe LePage¹

¹ECHO Asia Impact Center, Chiang Mai, Thailand.

Tire gardens have many good uses, including growing a variety of crops where only concrete or poor soils exist, such as urban gardens, homegardens, and refugee camp settings. They can be raised onto supports to keep vegetables out of reach of livestock, and have also been used for vermicompost bins among other things. Tire planters make nice additions to many kitchen gardens around the world, being accessible right out the front door. Best of all, they are a cheap raised bed, and reuse an otherwise voluminous waste product.

We use them at the ECHO Global Farm in the US for growing perennials and annuals, including fruit trees and seed crops. Tires are not used exclusively by ECHO, but have been promoted by our partners in many places, as appropriate container options.

An emerging question is whether or not they are a safe option for planting edible crops. Is it possible that plants take up heavy metals or other toxic elements present in the tire?

To begin seeking out an answer, we first tested soil and garlic chive samples that had spent 20 years in a tire on the ECHO Global Farm in Florida. We compared these to soil and garlic chive samples planted directly in the ground on another section of the farm known as the Lowlands. These were our results:

- Tire Garlic Chives: 1.17 ppm lead
- Tire Soil: 9.88 ppm lead
- Lowlands Garlic Chives: Below Detectable Levels
- Lowlands Soil: 4.28 ppm lead

The World Health Organization (WHO) points out that there is no known, safe level of lead for small children (WHO 2018). According to international food standards, leafy vegeta-

bles should not have more than 0.3 ppm lead (FAO/WHO 2015). Twenty years of perennial garlic chives in the same tire is a worst case scenario, but if a perennial is planted in a tire, it is a lot of work to move them and tires last a long time. One could feasibly leave a plant for a decade or two.

The Environmental Protection Agency (EPA) in the United States notes that soil normally contains lead at less than 50 ppm (ATSDR 2017; Grubinger and Ross 2011). Lead concentration in our soil is well below 50 ppm, suggesting that the garlic chives have picked up the lead from some other source or for some other reason. We do not know whether the roots in contact with the tire wall or pooled leachate in the tire rim is the cause, or whether a lack of nutrients caused the roots to uptake heavy metals. Both may have contributed.

The question now is how long does it take for the heavy metal contaminants to build up to a dangerous level? We are beginning to test this at ECHO Asia Small Farm Resource Center in Chiang Mai, Thailand by setting up an observational trial for 10 tires. Over the next 10 years, the research staff will test the soil every year for either lead, cadmium, or chromium on a rotating basis. If the soil is contaminated, we will test the garlic chives planted in the tires.

This experiment is designed to define the boundaries of risk and what should be studied more. We are comparing worst case scenarios, including (1) extremely degraded tires, (2) tires treated to prevent contamination—by turning the tires inside out, (3) lining tires with plastic, or (4) painting them. We also have an



untreated tire to see a 'normal' situation and two plastic containers as controls.

We took baseline data for this experiment at ECHO Asia and found our garlic chives—recently transplanted from a raised bed into tires—are below 0.05 ppm, as close to the previously-mentioned maximum allowable limit of 0.3 ppm as we could measure. Our initial soil mix is at 20.33 ppm. This is double the level in the 20-year-old tire's soil in Florida (9.88 ppm), but still within the EPA's normal limit of 50 ppm.

Over time oECHO Asia will provide updates to share what we have found about tire safety: whether the lead levels increase or stay the same. To our knowledge, no one has made significant effort to study this question in depth, so even our initial results of the 20-year old garlic chives will add to the conversation.

Below is some information referenced above and for further reading. Please let us know if you have any other thoughts, particularly insights on knowing the risks of gardening in tires and how to minimize those.

REFERENCES

Information on Thresholds of Heavy Metal in Soil:

- Ministry of the Environment, Finland, 2007. Government Decree on the Assessment of Soil Contamination and Remediation Needs
- Agency for Toxic Substances and Disease Registry. 2017. Case Studies in Environmental Medicine (CSEM): Lead Toxicity
- Grubinger, V. and D. Ross, 2011. Interpreting the Results of Soil Tests for Heavy Metals. University of Vermont Extension 1.
- Fisher, B. and ECHO staff. 2016. Tire Contaminants from a Container Gardening Perspective 1. ECHO Development Notes 130:1-3

Information on Thresholds of Heavy Metal in Plant Tissue:

- FAO/WHO (2015). General standards for contaminants and toxins in food and feed (CODEX STAN 193-1995)

Information on Lead Poisoning and Human Health:

- WHO. 2018. Lead poisoning and health 1



Upcoming in 2020 at the ECHO Asia Farm

Over the last 18-24 months we have been moving to our new farm location just 25 minutes outside of Chiang Mai. We have built raised beds, an agroforestry walk, planted over 200 banana trees to develop our on-farm feed systems... and much more!

Beginning in 2020, we plan to offer a variety of Tours, Workshops and Trainings at the ECHO Asia Farm! We want to invite you all to come visit us! The ECHO Asia Farm will regularly host a range of training opportunities for development workers and other like-minded individuals and organizations:

Half Day Educational Tour gives an overview and exposure on various appropriate technologies and research around the farm.

One Day Workshops - an introduction to topics related to **Seeds, Soils, and Feeds**, and others, such as Community Development.

Three-Five Day Trainings - an in-depth training on the above topics or topic offered by ECHO or requested by learners.

Volunteering and Internships - available to Asians and other nationals for 3-6 months to train with, and work alongside ECHO Asia staff in on-going projects and initiatives.

The following 3-day trainings are already tentatively scheduled:

- **On-farm Livestock Feed Systems Training**- 25-27 February 2020
- **Seed Saving & Banking Training**- 24-26 March 2020

If you have questions or would like to visit us, please contact us at asiahospitality@echocommunity.org or fill out our [Needs Assessment Survey](#)!

We will post more information soon- please check back with us on ECHOcommunity.org

New Seedlings Available at the Farm!

In addition to providing seeds of Neglected & Underutilized Crops, we now also have SEEDLINGS available for purchase at the ECHO Asia Small Farm Resource Center.

Come by the farm to pick up any of the following:

- **Perennial Peanut** (*Arachis glabrata*) - 5 THB
- **Chaya** (*Cnidoscolus aconitifolius*) - 50 THB
- **Purslane** (*Portulaca oleracea*) - 50 THB
- **Aloe Vera** - 50 THB
- **Chili 'Karen'** (*Capsicum annuum*) - 10 THB
- **Eggplant** (*Solanum melongena*) - 10 THB

Check back with us as we plan to make more varieties available!



Opportunities from the Network

Participatory Methods for Engaging Communities (PMEC) Workshop

Chiang Mai, Thailand - 23-28 March 2020

Date: 23 - 28 March 2020 (immediately before the EMDC 2020)

Place: Linguistics Institute of Payap University (Mae Khao Campus), Chiang Mai, Thailand

Cost: Approx. \$200 USD (Exact amount to be determined. Accommodation not included but available nearby for as low as \$17 USD/night.)

Registration Page: <http://bit.ly/PMECChiangMai2020Reg>

PMEC provides facilitation training for people who work with communities. The training equips participants with the mindset, techniques, and tools for applying a participatory approach in facilitating group processes, such as discussions that help the group to describe and analyze their own situation as well as decide and plan what to do about it together. This approach encourages participation, builds consensus, and increases ownership among local stakeholders in all aspects of the work with the community involved.

This workshop focuses on the application of a participatory approach to Scripture engagement in minority language communities, but it is also useful and open to anyone who wants to facilitate participation in team, organization, partnership or other community settings.

Workshop Content: During the workshop, participants will:

- Learn what a participatory approach is and why it is useful
- Practice basic facilitation skills: listening well, drawing out people's thoughts, etc.
- Observe some participatory tools and techniques being used
- Practice facilitating discussions using participatory tools and techniques
- Receive feedback on facilitation
- Provide others with feedback as they facilitate these tools
- Assess which tools work best in which situations
- Adapt tools to fit specific contexts
- Develop facilitation plans for meetings and events using a participatory approach

Note: During the workshop you will facilitate two 2-hour discussions with groups of people in the Chiang Mai area. We try to schedule these during workshop hours, but certain groups may only be available in the evening. Please keep your schedule as open as possible on Wednesday through Friday evenings. Thank you!

For more information about the workshop: <http://bit.ly/pmecworkshop>

If you have questions, please contact: pa_asia@sil.org



COMMUNITY HEALTH EDUCATION

CHE TOT 1

Training of Trainers

April 3-6th, 2020
Chiang Mai, Thailand

To Register:
chenetwork.org
- Training
- Training Events

Call for Articles & Insights

If you are new to the ECHO Asia network, we wanted to highlight a few things that you may find add value to your free membership to ECHOcommunity.org and can help you be more effective.

1. Please do remember that a “Development Worker” membership entitles you to 10 free trial packets of seed per year! If you would like more seed packets or larger quantities of some seeds (especially green manure/cover crops), we do have additional seed packets and bulk seeds for sale, and our [seed bank catalog is available online](#).
2. Please also know that besides being written in English, our [ECHO Asia Notes](#) are translated and available for free download in Thai, Khmer, Burmese, Mandarin, Bahasa Indonesia, Vietnamese, and Hindi languages.

3. Additionally, we have a special place in the [Asia section of ECHOcommunity](#) for additional technical resources, free book downloads, and presentations from past ECHO Asia events and workshops.
4. If you have never joined us for an event, please consider doing so- there are several events happening in 2019 and we would love for you to join! Please go to the [events page of ECHOcommunity.org](#) to learn more.

In addition to using our information, we strongly encourage you to provide feedback to us in order to better know how to serve you and help us to refine our resources and delivery.

We encourage you to share success stories, lessons learned, insights, [Facebook posts](#), etc. with us to keep us abreast about what you are trying and what is working in your context.

Additionally, if you have any ideas or would like to write an article for an upcoming ECHO Asia Note, we invite you to do so! Thank you for reading, and please do stay in touch!

Sincerely,



Patrick Trail, M.S., CCA
Research Coordinator & Agricultural Trainer



Daniela K. Riley, MBA
Operations Manager

