

## FEASIBILITY STUDY ON NATURAL DYES



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This study is an initiative of RELOKA (Re-inventa produsaun local), a social company in Timor-Leste, based in Dili, which combines the development of locally made and resourced products with protected work for people with special needs. The RELOKA team has explored the feasibility for a business case for natural dyes in Timor-Leste. Involved in this study were Cecilia Assunção as coordinator of the field data collection, Janila Maria Fernandes as assistant field data collection and Hilly Bouwman as main lead in the data collection, analyzing and reporting.

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Hilly Bouwman

Founder RELOKA initiative

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## ABBREVIATIONS AND EXPLANATIONS

|           |   |
|-----------|---|
| ETWA      | East Timor Women Association  |
| LO'UD     | Weaver group in LosPalos  |
| MAF       | Ministry of Agriculture and Forestry  |
| MARENU    | Weaver group in LosPalos  |
| MDF       | Marketing Development Facility  |
| MTCI      | Ministry of Tourism, Commerce and Industry  |
| NGO       | Non-governmental and non-profit organization  |
| RELOKA    | Re-Inventing Locall Production, Social company in Timor-Leste   |
| SEAC      | Secretary of State of Arts and Culture  |
| Taum Abas | Weaver group in Oecusse   |
| ToL       | Threads of Life   |
| UNESCO    | United nations Educational, Scientific and Cultural Organization  |
| Ash-water | Is water that has been mixed with the ash of hardwood tree trunks and rested for 1 week, for the ash to settle  |
| Dye-vat   | Is the pot with prepared dye, ready to use to dip in the fabric and yarn  |
| Finishing | Is the last step of the dye process, excessive dye has to be washed out of the fabric or yarn and/or dye will be fixed on the fabric or yarn. Depending on the recipes different methods are applied, but in general it contains stages of washing the fabric/yarn    |
| Futus     | Are the complex traditional and local designs that are created with a tye-dye Technik and integrated in Tais. They are the parts that add extra value to the Tais   |
| Mordant   | Is a substance (pure or combination of minerals) used to bind dyes on fabrics, in our case we work with Symplocos, which contains alum  |
| Scouring  | Is the first step in the dye process and is the washing process of the fabric and yarn, washing out the oils and dirt that has been left behind during production. The fabric and yarn need to scoured in a hot water pot with a mix of ash-water and PH neutral soap |
| Tais      | Is the handwoven traditional textile in Timor-Leste, it plays an important role in the life of Timorese people. The textile is used for decoration and to create traditional clothing with specific styles for men and women  |

## INTRODUCTION

This feasibility study was initiated by RELOKA. RELOKA is a social company in Timor-Leste, based in Dili, which combines the development of locally made and resourced products with protected work for people with special needs. RELOKA, which started its existence in 2018, is now a well-established producer of kitchenware and other touristic products, made by hand and with respect for the environment and the makers.

RELOKA has since 2019 a production in garments made from 100% cotton fabric, such as bags, aprons, napkins and tablecloths. The fabric that we use is a 100% cotton (Calico), but is only available in off-white in Timor-Leste. As customers kept asking for other colors of the fabrics, we started to develop the plan to explore whether the traditional colors that weavers use in Tais, could be also used for fabric and whether there is a market opportunity for this kind of production. Elaborating on this thought, we have become enthusiastic about applying Timorese natural dyes for our products and even beyond.

But as natural dyes are a new area of expertise for RELOKA, it was planned to do this feasibility study as a first step, in order to assess the processes, needs, challenges and opportunities, before starting off. The total plan includes the preservation and development of the natural dye techniques in Timor-Leste, by developing an expertise center and production studio and a range of new products.

In order to start off, Market Development Facility from Palladium, has supported this first stage of the project, which is to find the business opportunities and challenges in applying natural dyes.

## SUMMARY

This feasibility study aimed to explore the chances and challenges for commercial natural dyeing, with the use of local Timorese ingredients. The study focused on Skills, Resources and Market and has collected data with local weaver groups in LosPalos and Oecusse, in experienced dye centers in Bali, and from direct testing of natural dyes in the RELOKA office.

## CHANCES FOR NATURAL DYEING INITIATIVE IN TIMOR-LESTE

- There is a gap of knowledge and skills for qualitative natural dyeing in Timor-Leste
- Natural dyes are part of Tais process and thus of the traditional heritage of Timor-Leste, for which reason the conservation of knowledge has become important.
- SEAC has a demand for trainers about natural dyes from 2024 onwards.
- Trainings can be provided by Threads of Life from Indonesia (for a consultancy fee).
- Almost all resources can be sourced in Timor-Leste, and this resourcing will provide market for rural communities.
- For larger-scale, an agriculture and agroforestry supply chain can be created, providing income for rural communities.
- Indigo also known as Taum, is a promising color source for blue, it can be cultivated and also has a market in the cosmetic industry.
- Symplocos is grown in Timor-Leste, in Ermera. Enhancing the quality of harvesting and processing can provide for in-country mordant source.
- A diversified market, including sales of products and half-products, yarn for weavers, touristic workshops, consultation and training, can provide for sustainable funds.

- RELOKA has land available for the expertise center in Hera.
- On the long-term the natural dyeing can accelerate the market for local grown cotton.

#### CHALLENGES FOR NATURAL DYEING IN TIMOR-LESTE

- To start up a self-sustaining expertise center takes time, as natural dye-ingredients are agricultural products and have seasonal grow-cycles.
- The first two year the center will only be building and testing its expertise and not yet be able to gain steady income to sustain. The center will need support to start-up.
- Quality control of supplies from communities is challenging. As they are far away and many factors can influence the quality of the ingredients.
- It will be challenging to get a regular supply of ingredients, because of seasonality and road access in raining seasons.
- In regards to the dyeing; It is difficult to achieve a constant quality of dyes and of consistency in the results of the colors.
- Fabric and yarn need to be imported from Indonesia, but its quality is difficult to predict when we are not in Indonesia to select it.
- There is a shortage of locally grown cotton, and handspun yarn is becoming a rarity. Additionally, the quality of handspun yarn is not very consistent.
- Natural dye products only serve a local niche market and are difficult to export, because of enormous competition from India, Pakistan, Java, etc.

#### CONCLUSION

It can be concluded that there are chances for an expertise center on natural dyes to be developed and sustain itself, as the country has a need for conservation, transmitting and promotion of the cultural knowledge and skills.

Although natural dyed products serve a small niche market, diversifying the work/market for the center with ready-made products (bags, wallets, clothes), half-products (fabric and yarn), touristic workshops, training and consultancy and research for conservation, will help the center to sustain itself in the future.

Nevertheless, before becoming an expertise center for natural dyes, the initiative needs to develop many skills (which can be sourced in Indonesia and with local weavers), a sustainable supply chain of dye resources and a market for the dyed products needs to be created. Al together it will take at least two years for the expertise center to develop itself and its relevant plantations in communities before it will be able to sustain itself.

## BACKGROUND



Picture 1, Tais seller at Tais market

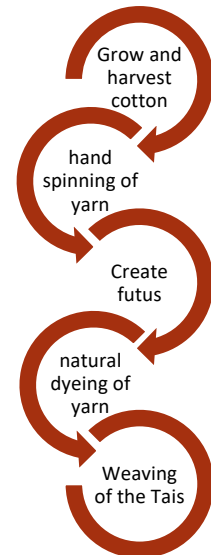
In Timor-Leste, women have been dyeing cotton yarn for ages. Natural dyeing is an important step in the creation of Tais, 'a local weaving that is traditionally made by the women and used for cultural ceremonies. Traditionally each household grew its own cotton trees, just enough to supply for its own needs for Tais. And in each household's garden, there were trees and plants that were needed for dyeing the cotton.

Other resources, from trees and plants were provided by the forest and women and men knew how to harvest them. These resources were cherished, as they were valuable to the communities and families' ceremonies. Tais have recently become a cultural heritage of Timor-Leste, acknowledged and protected by UNESCO.

But currently only few women still grow their own cotton, as they do not want the burden of spinning their own yarn, as it is so much easier to just buy the yarn from the shops. And the new generation of women is less interested to learn all the ins and outs of making Tais. With this new generation, the knowledge about making Tais is threatened to get lost.

Including the knowledge, skills and resources for dyeing fabric. Natural dyeing is one of the important steps in the creation of Tais. Recipes for natural dyes have been passed on by women from generation to generation and differ from family to family and from region to region. Ingredients for the dyes are determined by the trees and plants that are available in the specific region.

RELOKA has taken on the mission to preserve the local knowledge of natural dyes and promote the traditional colors of Timor-Leste. We start of with a feasibility study, in order to understand the stakeholders and their challenges and to find the chances for natural dyes.



## OBJECTIVE OF THE FEASIBILITY STUDY

The feasibility study aimed to explore the chances and challenges for commercial natural dyeing, with the use of local Timorese ingredients.

This study looked into four domains:

1. Skills: what are current skills and methods in natural dyeing in Timor-Leste and what is the quality of the results. What colors did Timor-Leste develop, where can additional knowledge be sourced?
2. Resources: Which ingredients are currently used by weavers, what additional ingredients would be needed, where can ingredients be found and how can ingredients be sourced on a higher scale? In other words, how is the supply chain?

3. Market: What are the needs of weavers for natural dyes, what is the need for extract on the international market, Possible unique selling points of Timor-Leste's resources and colors.
4. How to move forward: What are possible collaborations in and outside of Timor-Leste (Alola Foundation, weavers' networks, LO'UD, MTCI, UNESCO, Timor Aid, Threads of Life, Things and Stories, etc.)? What do we need to further develop as an expertise center and to create a market for weavers and farmers?

## METHODOLOGY

For this study we created a team of three dedicated staff, consisting of a national project coordinator, project officer and international consultant, who is the RELOKA director.

We used different approaches to find the information needed for the feasibility study;

1. Desk study of local and international reports and information
2. Conversations with important stakeholders, including weavers' groups, UNESCO, Alola Foundation, Timor Aid and the Tais Committee PKI
3. Field study in Timor-Leste (Los Palos and Oecusse)
4. Field study at Threads of Life, and Tarum Bali in Bali, Indonesia
5. Testing of ingredients and recipes

## FINDINGS FROM THE DATACOLLECTION AND TESTING

### STAKEHOLDER CONVERSATIONS

Before and during field visits, the team has met with several stakeholders, like; Sra. Maria do Céu Lopes da Silva from TimorAid, sr. José Ximenes from Alola Foundation, sra. Adelina Carly Tilman Lourdes from UNESCO, sr. Manuel Smith, General Director Secretary of State of Arts and Culture (SEAC), sr. João Ferro, owner of Things and Stories and individual local weavers.

**Sra. Maria do Céu Lopes da Silva from Timor Aid;** TimorAid's main mission is the preservation of the cultural heritage of Timor-Leste, which includes the Tais of Timor-Leste. In relation to Tais, TimorAid does research in order to capture the knowledge of traditional weavers of Tais, they collect culturally relevant Tais and organize transformation of knowledge to new generation of weavers.

TimorAid is a member of the SEAC's Tais committee, PKI (Preserva Kultura Industrias), which worked hard on getting the Tais heritage recognized as a UNESCO world heritage. In relation to this recognition TimorAid together with UNESCO, has initiated research on natural dye ingredients (trees and plants) in May 2022. At the time of writing this report, the research report has not yet been publicized and thus findings from this report could not be considered in our study.

According to sra. Maria do Céu Lopes da Silva, the biggest challenge in the area of natural dyes is that dyes are not wash and color fast and that the quality is not consistent. Women frequently receive trainings from either TimorAid or Alola Foundation, but the trainings have not much evolved during the years and new techniques are not introduced. She also would like to see more Indigo being used



in the Timorese Tais, as this is a popular color with good quality, but it is hardly used and there is no specialism about it in Timor.

A second challenge is that these days, weavers mix synthetic dyes into their natural dyes in order to comply to demands of sustainable colors and it is more and more difficult for external buyers to know whether a color is 100% natural or not.

A third challenge is that there is not much local cotton available to the weaver groups, which makes it more and more difficult for them to create 100% traditional Tais with local cotton. We now often see Tais with a local cotton Futus<sup>1</sup> but the other parts and colors are made from imported industrial yarn, synthetically dyed.

A fourth challenge is that knowledge is not being transferred any more from generation to generation. Until the last generation this knowledge was automatically transferred, as making Tais was a must for every woman, since it was part of their wedding ceremony and other cultural events. But modernity has made its entry into Timor-Leste and most young girls have no more aspiration to learn the skills for making Tais. She fears that very soon the traditional Tais might become extinct if actions are not taken.

**Sr. José Ximenes, Alola Foundation;** The Alola Foundation is a well-established NGO in Timor-Leste, which focusses on women economic empowerment. Next to the Foundation it also has established a not-for-profit company (Alola Esperanza) for the marketing and sales of Tais and products made from Tais. In relation to Tais, Alola Foundation, mainly focusses on providing a market for the weaver groups and providing technical training. Alola Foundation is also a member of the Tais Committee, PKI.

Sr. José Ximenes is one of the most educated persons in Timor-lete on the area of natural dyes. He has had training from Threads of life (ToL) and several others and he knows about almost all the ingredients that are used in Timor-Leste for natural dyes. Sr. José Ximenes is the main trainer in natural dyes and Alola Foundation provides trainings to weaver groups on a regular base. Alola Foundation also holds a small supply of essential ingredients for natural dyeing, like Loba, which they buy from a group in Ermera. Loba is in Bahasa Indonesia known as Symplocos and very important in the recipe of red dye and as a mordant (although it is not used as a mordant<sup>2</sup> in Timor-Leste).

Sr. José Ximenes also expressed his concern for the preservation of the knowledge of the traditional natural dyes. And he mentioned that there is a lack of knowledge in Timor-Leste for natural dye techniques that would provide for possibilities to develop products with an international quality.

In 2009 Bebali foundation/ToL has done a survey for the Alola foundation<sup>3</sup>, to help them to increase business opportunities. The report recommends to find a niche market for high quality and traditional Tais. Additionally, the report looks into information of Tais, the information about Futus is somehow clear and complete, but the information of the natural colors is very limited and incomplete. The researchers had looked into the availability of Alum, which is an important source for mordanting of the yarn or fabric before dyeing. This source can be found in the leaves of the Symplocos tree (Loba in Timor-Leste), a tree that only grows in Ermera and is exploited by one community, that sells the leaves to other weaver groups in the country (before traded for goods). But ToL found that the quality of the leaves is not so good, probably because of the lacking knowledge for harvesting. Nevertheless, this low

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<sup>1</sup> Futus is the drawings in the Tais, that is created with a tie-dye technique. It is a traditionally important part of the Tais.

<sup>2</sup> Mordant is a source for preparing the yarn and fabric, before dyeing. It opens the pores in the cotton so that the dye can easier attach and stay to the yarn and fabric.

<sup>3</sup> Howe J. (2009) A REPORT TO ALOLA FOUNDATION Dili Timor Leste, Threads of Life & Yayasan Pecinta Budaya Bebali

quality these leaves are sold to groups for \$25 per kilo. Additionally, they had investigated in their laboratory the tree leaves of Rufa (used in LosPalos), and found that it sure contains Alum, but its concentration of Alum is not as good as Symplocos. Also, the researchers came across other dye plants, which are not being used by Timorese weavers, but are used in Indonesia.

**João Ferro**; owner of Things and Stories (T&S). T&S is a local social company that invests in local groups who produce traditional products. They develop products, provide training and a market for the products through their T&S shops. T&S buys and sells traditionally made Tais and has high standards for its quality, as they serve a high-end tourist market. T&S's perspective on the Tais and natural color is one of an international market perspective.

T&S experiences several challenges when buying Tais from Timorese weaver groups:

- The production of Tais is very seasonal. Local cotton and many dye ingredients grow only in certain seasons, for which it is difficult for T&S to get a year-round supply of Tais in specific colors (which are demanded by the market).
- There is a shortage of locally grown cotton. Which is an important limitation to the production of traditional Tais. Firstly, less and less women grow their own cotton and secondly, those who have local cotton, get out of stock by the end of the seasons.
- The quality of the dyes that are used for Tais have not yet reached a satisfying level for the international market. Colors are not yet wash and light fast. Also, quality control of the natural dyes is difficult to manage because of the many different weaver groups, different recipes and other many different variables in the dyeing process, as well being far away from the groups that are active in the rural areas.
- The groups still lack decent technical training on making wash and light fast colors, their skills training is always very accidental and not imbedded in sustainable settings, for which it is difficult for them to really develop skills and a consistent quality.
- Currently T&S has no means to control whether natural dyed yarns/Tais are mixed with synthetic dyes (one-tex). Because of the demand for consistency in quality more and more women choose to use one-tex. It is easier, cheaper and has a better result.
- The international market needs direct supply of high quantities of products with a consistent and good (wash and light-fast) quality. Until now the groups are not able to answer to these demands due to seasonality of ingredients, shortage of ingredients and lack of quality control.

In relation to these challenges T&S has the following recommendations:

- A central production center which can provide qualified 100% natural dyed yarn and other products and can answer to higher demands, and will be helpful to increase the market and quality consistency.
- A natural dyeing expertise center will be helpful to the weaver groups when it develops a year-round stock of coloring ingredients, creates natural dye extracts and produces natural dyed yarn, which can all be purchased by weaver groups.
- An ingredients bank or some provision of full-year dyeing ingredients would help to provide a more consistent flow of products.

- More technical expertise for the groups, in relation to better quality dyes would be helpful to provide for better quality products. But this expertise should be provided in a sustainable setting, providing on-going coaching and quality control, support in setting up color gardens and color production workshops and a supply chain for ingredients for colors.

“Better quality of natural dyed yarn will increase the market for Tais”. (João Ferro)

**UNESCO representative sra. Adelina Carly Tilman Lourdes;** UNESCO has recently acknowledged the traditional Tais as a cultural heritage, and is currently facilitating the government in the safeguarding of their heritage. For the cultural heritage of traditional Tais, a Tais committee (PKI), consisting of the most important institutions and organizations working with Tais, exists, led by the Secretary of State of Art and Culture. Other partners in the committee are, Ministry of Tourism and Commerce, UNWOMEN, UNESCO, TimorAid, Kor Timor and Alola Foundation. UNESCO’s role in the Tais committee, is merely a role of facilitating. UNESCO facilitates the committee with the creation of a safeguarding plan for the cultural heritage of Tais, consisting of 6 points:

1. Good research on Tais
2. Awareness of the cultural value of Tais
3. Transmission; training to younger generation in making of Tais
4. Marketing of traditional Tais/Promotion to international tourist/market
5. Conservation
6. Support the weavers’ network

Sra. Adelina Lourdes believes that a natural dyes expertise center can contribute to the existing safeguarding plan, on the following 4 domains:

- Marketing and promotion of traditional Timorese natural dye colors (through natural dye studio and workshops for education and touristic purposes)
- Preservation and cultivation of color trees/plants (including a nursery/seedbank/botanical garden but also creation of supply chain);
- Transmission of color knowledge (through development of natural dyes expertise, including education/training center)
- Quality improvement of local colors (improvement of recipes)

A natural dyes expertise center can contribute to the existing safeguarding plan of the Tais Committee.

**Local weavers;** During the study the team has spoken to several individual weavers about their dyeing process and their challenges and needs. The conclusions are as following:

A young woman in Los Palos, who is specialized in making Futus, mentions that she buys the locally made yarn at the local market, but that it is becoming more and more difficult to find local yarn because less and less women are growing it.

Local weavers in Los Palos start to mix their Tais design with imported yarn, because of the reasons like the scarcity of local yarn, the high price for local yarn and the market demand for quick delivery. In most current Tais they use pre-colored (synthetic) yarn for the biggest parts and use local and natural dyed yarn only for the Futus. For instance, in Tutuala the weaver was working on an ordered Tais, but needed to deliver within 3 weeks, for which she could not prepare the natural dyes. She bought the Futus from another producer and used industrial colored yarn that she can buy in the shop for the other parts of the Tais.

Some weaver groups claim that their natural dyes are washable and lightfast. But specialists from TimorAid and Alola Foundation mention that they have never come across this quality in Timor-Leste. Weavers do mention that some women mix their natural colors with synthetic colors.

When we ask local weavers if they would be interested to buy natural dyed yarn from us, they say that they are interested, but depends on the price. Currently they put much efforts in growing the dye plants around their houses and gardens, but sometimes they have to source synthetic dyed yarn, as they have no supply, because of season or because the plant/trees are not available. When natural dye resources can be sources year-round, they can work on orders year-round, which will increase their market.

**Sr. Manuel Smith;** General Director of the Secretary of State Department of Arts and Culture and president of the Tais committee PKI, expresses the need for a training institute for natural colors and that government is willing to work together for providing trainings to communities. RELOKA can register its name with the SEAC when it is a foundation and they will make a MoU in which they acknowledge the organization and agree to work together on the conservation of knowledge and resources and promotion of business in relation to Tais and natural dyes. If RELOKA develops a training module and become expert, the government is interested to assign RELOKA for providing natural dye trainings. Currently they work with Empreza Diak and Alola Foundation to provide training in business and in making of Futus. This coming year (2023) they have already made their year plan and budget, so any new planning, that could include trainings from our expertise center would be for the year 2024.

Sr. Manuel Smith is also very interested in our embroidery skills. As he also acknowledges that embroidery is a cultural tradition in Timor-Leste, introduced by the Portuguese. He asks if we can develop a curriculum for training in the technique desfiadu, cross-stitch and direct embroidery. We already have a curriculum for our embroidery technique and can easily gain more specialism in the other techniques. For instance, the knowledge about desfiadu is only 5% left in Timor-Leste, but this work has a high value.

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## CONCLUSIONS FROM STAKEHOLDER INTERVIEWS

- Chances for the use of Indigo (blue) are not well explored in Timor-Leste, Even though the *Indigofera Tinctoria* is growing well in Timor-Leste. Expertise on Indigo is not available.
- Knowledge about natural dyes that was always transmitted from generation to generation, is not being transmitted anymore as most of the young women have no interest in learning about making Tais.
- *Symplocos* (an important source for mordanting) is available in Timor-Leste, but extensional knowledge about its harvesting and processing is not available in Timor-Leste. There has never been any training provided about it.
- There is less and less supply of local cotton yarn for the producers of traditional Tais and Futus. If there is no market being developed for it, the production of it will totally stop and only industrial imported yarn will be available.
- The seasonality of resources like cotton, indigo and other trees and plants, prevents weavers from providing year-round products with natural and local resources. There is no knowledge about preserving resources for other seasons, in a manner like extracts for instance.

- For the international market, the weavers lack consistency in quality and quantity. They cannot answer to demands of high quality, color consistency and wash-lightfast guarantees.
- In the future it will be more difficult to guarantee whether Tais are made of 100% natural resources (which is a requirement for the UNESCO heritage). Only specialists can distinguish natural dyed colors from colors mixed with synthetic dyes.
- The SEAC is very motivated to preserve traditional handicraft techniques and still has a need for training in traditional embroidery and natural dyes, to share to communities. Also, Alola Foundation and TimorAid mention the need for better training in natural dyes.

## FIELD STUDY IN TIMOR-LESTE (LOS PALOS AND OECUSSE)

The team has visited a traditional Tais group in Oecussi, Taiboko, the group is called Taum-Abas and two groups in LosPalos, one is LO'UD, which has had training before and has support from Australian NGO ETWA (East Timorese Women Association), the second group is Tais Marenu they are trained by Alola foundation. All groups were recommended to us by TimorAid.

In Oecussi In total six colors were shared by the group to the team. The Tais group showed the process of coloring from the beginning to the end for each color. The colors were, Yellow, Orange, Red, Green, Grey and Black. In Lospalos, the group LO'UD was able to share the making of four colors to the team. Pink, Yellow, Brown and green and the group Marenu shared also four colors, but with different recipes. Pink, Brown, Black and Yellow.

**Taum Abas;** Taum Abas is a Tais weaver group in the remote mountains of Oecussi. To reach their village takes a one-and-a-half-hour motor ride, from the central market, on rough terrain, and in the raining season this road is very difficult to access. Additionally, none of the women in the group speak Tetum. These physical and language barriers make it very difficult for this group to develop their market. On the other side this is one of the few groups that grow their own cotton and still produce Tais that are 100% made of local cotton that is naturally dyed.



Picture 2, Taum Abas group and family, in their cotton/taum field



Picture 3, Taum (Indigo) vat

The ingredients that they use are minimal, as they mainly use turmeric for yellow, orange and green, and Taum for a grey/blue color, black and as a base for green. The recipes for these colors are transmitted to them by their ancestors, while they learned the recipe for red from Alola Foundation with the use of Loba (*Symplocos*), which they have to source through Alola Foundation, as it does not grow in Oecusse. Additionally, they use lime powder, limes and tamarind as acids.

The dye technique for yellow, orange and green is very basic, they create one dye-pot, crushing the ingredients together without boiling, after which they very shortly dip the yarn in the dye pot. Only the red color is being boiled. The Taum vat is prepared in a ceramic pot. It is a mix of Taum leaves, together with other leaves, which is supposed to get better over time. It ferments. It was remarkable that the women do not scour the yarn before dyeing and they use the mordant “Loba” only for the recipe with red and they put only little attention to the finishing process of the dye. A reason can be that they did not have direct access to water, which means that they do not want to unnecessarily spoil water another reason can be that they do not want to wash out the colors of the yarn because the colors will become paler, they rather keep the colors bright and not wash the Tais. As for the use of the Loba, they use only a little bit, because it is difficult for them to source it.

After the field visit the fabrics and yarns were taken to the RELOKA office and tested on wash-fastness. All colors from Taum Abas became very pale after washing. It is assumed that the turmeric-based dyes, in combination with a recipe that does not contain boiling the dye-pot, do not provide sustainable colors. Also, after testing a ready-made Tais (with mixed colors), just by dipping it in cold water, already made the colors come off, even colors made with the Taum (Indigo).

Taum Abas has a field just outside of the village where they grow cotton and Taum (*Indigofera Tinctoria*), the field is maintained together with the husbands of the women in the group. They produce the cotton for their own use. They store the cotton in rice bags under the roof. When asking if they were interested to sell the raw cotton, they mention to not know. They do not know where the market would be to sell it and have no idea about a price. They do though sell their own spun yarn to a training center in Panta Makassar (Oecussi’s capital), for \$2 per yarn ball. Taum Abas has difficulty with finding a market for their Tais. They used to supply Tais to Alola Foundation, but lost the connection due to change of leadership.



Picture 4, Color results of Marenu Tais groups

**Marenu Tais;** Marenu Tais is a small family-based weaver group in Los Palos, who mainly produce for the local market, as well as for Alola Foundation. They have had training from Alola Foundation and use recipes that they learned from Alola Foundation. They do not have their own recipes. They source their ingredients mainly in the forest. Like barks of trees and wild red onions. Marenu Tais group source their own Loba, called “Ai-Uskai” in LosPalos, but as mentioned before by ToL, this Ai-Uskai contains a smaller concentration of alum than

the Symplocos tree.

Marenu does not grow any local cotton and only uses industrial Indonesian cotton yarn for dyeing and weaving. The yarn is sourced in local shops. They mentioned that the women feel that spindle-spinning of yarn is too much work. Marenu Tais, just as Taum Abas does not scour or mordant the yarn before dyeing and does not finish the yarn after dyeing, but they do boil all the dye-pots before they dip the yarn in. This boiling seems to add to the quality of the dye-pot, since the quality of the Marenu Tais colors were much better than the Taum Abas colors.



Picture 6, Marenu Tais members in action, making red dye

Especially pink and brown are very promising after the washing test at the RELOKA office. Their black and yellow were less sustainable, as they lost a lot of color in the wash-test. Black is made by a mud-



Picture 5, mud-based dye-vat for black

based dye-pot where Taum is added. Marenu Tais uses a recipe that is seen more in Timor-Leste, using mud and adding leaves that contain tannine into the dye-pot. This is differently with the technique from ToL, who makes a separate tannine vat and dips the yarn and fabric first in mordant, followed by the tannine and finished by the black mud dye. Marenu Tais had preserved some Taum, by drying it, but admitted that the quality is less than when they use fresh Taum, but at the time of testing it was out of season.

**LO’UD;** LO’UD is a well-established women cooperative and has a base in the city of LosPalos. The group is supported by ETWA (East Timor Women Association), an Australian NGO, in the area of product development. The group markets their Tais to Things and Stories and the Alola Foundation and is capable of providing touristic demonstrations about the making of Tais, although this hardly happens as the women are not easily available. LO’UD uses a mix of techniques that they have learned from Alola Foundation, Things and Stories and ETWA, combined with what they learned from their mothers. They have created a small garden where they source most of their dye plants, although some need to be sourced in the forest.



Picture 7, LO’UD group members in action



Picture 8, crushed wild red onions for pink

The group tested four colors, yellow, pink, green and brown. For pink they used the same recipe as Marenu Tais, using wild red onions. For green they used the leaves of wild beans, in yellow they mixed mango bark with turmeric and for brown they used different barks. They could not test a black or blue, as at the time of the testing fresh Taum was not available.

After testing it is concluded that their green is not at all wash-fast, While the yellow and brown had lost color but reached a stage of wash-fastness and their pink is most sustainable.

LO'UD also used a technique that involves boiling of the dye-pot before adding the yarn or fabric.

Also, LO'UD, just like Marenu Tais only uses industrial Indonesian cotton yarn and does not grow their own cotton. It can be concluded that in areas like LosPalos, where groups have more access to industrial yarn and also have more cash to buy it, they have already abandoned the local cotton and yarn. Whereas in Oecusse where Taum Abas has lesser access to shops and has no cash, they are still motivated to grow their own cotton and spindle-spin it. LO'UD did wash their yarn a bit in plain water before dyeing, but also did not use a mordant to prepare the yarn. They did do the finishing after the steps of dyeing. It became clear that "finishing" makes the colors paler, but prevents them from running off.

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#### CONCLUSIONS FIELD DATA COLLECTION LOSPALOS AND OECUSSE

- Most promising colors/recipes are the pink from Marenu Tais and LO'UD and the brown from Marenu Tais. Turmeric does not seem to be a sustainable color source and black/blue is promising but is dependent of the season for Taum.
- The colors recipes that did not include boiling of the dye-pot were least sustainable. In other words, boiling of the dye-pot before dyeing helps to enhance the quality of the color. Also finishing afterwards needs to be part of the process in order for the colors to not wash out anymore.
- Local groups do not scour their yarn before dyeing it and they do not use alum as a mordant before dyeing, while everywhere else in the world the use of scouring and alum mordant is found to be important to the sustainability of the color. The groups have no knowledge about scouring and mordanting, which leaves space for improvement.
- Availability of water will influence the process of dyeing and affect the quality of the dyed yarn. A successful consistent dye group will have to set up a full working dye studio, although simple but complete.
- Until now the groups do not have knowledge and ways to make extracts or in other way conserve ingredients for when they are not in season.
- The groups ask for help with improving their recipes, extending their products and access to market. Marenu Tais seems well motivated to work together on an equal (sharing) base. LO'UD was somehow reserved to RELOKA's approach, because they already have collaborations and



Taum Abas is very well motivated to work together, but will need a lot of extra training and has challenges in relation to water access and road access.

- We see opportunities to work with Marenu Tais and Taum Abas to help them with a new market share, when cultivating and supplying ingredients for natural dyes and raw cotton for the expertise center.
- Taum Abas already started to grow cotton, it is worth to explore how they could extend their cultivation of cotton and sell raw cotton on the market of Tais weavers in Timor-Leste.

## FIELD STUDY AT THREADS OF LIFE AND TARUM BALI IN BALI, INDONESIA

Two team members, Cecilia Assunção and Hilly Bouwman went to Bali, from 4<sup>th</sup> until 14<sup>th</sup> of November 2022, in order to learn from the experience from the Bebali foundation and Threads of Life (ToL) in Ubud, Bali, about natural dyeing of fabrics with local resources and about potential for a business model. Additionally, a natural dyeing factory in Gianyar (Tarum Bali) was visited and the market of natural dyes products was explored as well as the availability of resources in Denpasar.

Threads of Life has been in Timor-Leste in 2011, to do research for Alola foundation and they worked with Timor Aid. This was very helpful as they already know the Timorese context. Tarum Bali, is a commercial natural dyeing factory which uses the principle to only use local resources and they look at the sustainability of the resources.

The visit to Bali taught us that specially Java, but also Bali has a long history of natural dyeing of textiles. The arts of batik have been developed over centuries, inspired by Indian influences. But these influences have hardly reached Timor-Leste. The traditional natural dyes from Timor-Leste have hardly been influenced by the more sophisticated industry in Java and Bali. Indonesia has huge plantations/productions for dyeing ingredients spread over the islands, depending on where the resource grows best. Java has big plantations for indigo, which is mainly sold to the cosmetical industry. Ceriops (mangrove tree bark) is being extracted on Irian Jaya, where it is a by-product of a Ceriops tree plantation and Symplocos is grown and processed on Flores. There is hardly any local cotton industry, only on Sumba and in small scale in Java, where ToL and Tarum Bali have groups of weavers who grow their local cotton and still spin and weave with it.

**Threads of Life;** At Threads of Life the team has joined a two-training of two days at Threads of Life. In this training the making of indigo, yellow, brown and black was introduced. ToL only produces these four colors because they experienced until now only these colors reach a satisfying level of quality. It is the ToL's vision to use only ingredients that the weaver groups traditionally use and that are available in their surroundings. Currently ToL dyes mainly yarn, which they buy in Surabaya (from factory), dye in their studio and then spread amongst the weaver groups, and when they buy Tais from the weavers, they will deduct the price of the yarn from the total price. Additionally, they dye for designers and other



Picture 9, Training at Threads of Life

demands. Apart from the coloring they also have groups in Java that produce cotton fabric, which they also color and sell on again. Another major part of their income is the weekly 2-day training that they provide to tourists.

According to ToL, the main challenges for natural dyeing are around skills, resources and market.

Skills: because although you might think that the women weaver groups have the knowledge, it appeared that they do not have the knowledge to make quality colors. In their tradition they only used Tais for the cultural events, and they never washed them, they just hang them out for refreshing. So, in their tradition of natural dyeing, they have never learned or even prioritized how to make colors in such a way that the colors do not faint and can be washable (the same counts for dyes in Timor-Leste). So, for making 100% washable and quality colors the center had to become specialists themselves and learn from all the traditional recipes and international knowledge what is the best methods. They have developed a method that exists of scouring/washing - pre-mordanting - dyeing color - finishing. The results of the color depend on the quality of the color source, the quantity, and the tannin in the resource. They advise to focus as well on dyeing yarn, as it is sometimes difficult to color fabric very even. Secondly dyeing with natural sources takes time. Care and attention need to be given to each part in the process, from the growing of trees and plants, processing ingredients, choosing the fabric and yarn, scouring the yarn and fabric, pre-mordanting, dyeing and finishing.

Resources: Traditionally weavers sourced their resources for dyes in their local environments. Some ingredients they grow near to their community and gardens, for others they need to go to the forest. As they only dyed for their own use, their resourcing is in balance with the usage. But when you want to concentrate the production of dyes in one place (like we want to do with our center) you have to consider the sustainability of the resources. Since many local dyes are made from tree bark or wild plants, you cannot continuously harvest these ingredients without replanting or considering the health of the trees. So, when starting to dye as a small industry, you will need to find those resources that are easy to grow and replant and start to organize plantations or other ways of obtaining them without harming the environment. Also, they advised to choose and develop those recipes with ingredients that grow locally.

ToL's saying is: "What is made quickly, will disappear quickly, what is made with long time and care, will last longer"



Picture 11, color garden Threads of Life

ToL have developed an educational color garden next to the studio and office, which they also use to source small amount of ingredients. The garden is like a botanical garden. For higher scale needs they have developed their own indigo plantation and they work together with farmers for indigo and Symplocos, providing them training and controlling the quality and of course providing a market, as they buy from them. The process of the indigo farming can be



Picture 10, Example botanical garden

compared with specialty coffee production, which also needs to be done with care and constant control of quality.

Market: ToL mainly focusses on the local market for selling weavings. But then, their market is one of many tourists from Bali. They mention that in the export market the margins are very low and many times not worth it, as you need to compete with large scale operations in India, Pakistan and even Java, countries that have developed their natural dye industry since the colonial times. The director of Threads of Life, sr. William Ingram recommends to focus on a national market. It is better to create/find the niche market in Timor-Leste and promote the natural dyes products as special, 100% local, handmade and natural.

#### Methodology and ingredients Threads of Life

For scouring (washing of the fabric) ToL uses ash water, which is a combination of woodfire ash with water together with a PH neutral soap. For their own dyes they have created a recipe for an all-natural soap, but did not want to share this.

For mordanting ToL uses Symplocos. They source it from Flores. In Timor these trees have also been identified in Ermera and Dare. Alola foundation provides this Symplocos leaves to the weaver groups in Timor-Leste, but (as we brought a sample to ToL) the quality of this resources was not good. In order to use Symplocos for mordanting, training is needed to teach the farmers/groups about harvesting and processing the leaves, in order to preserve their alum.

For color indigo ToL has introduced an indigo species from the Himalaya in Indonesia, which is now being cultivated in Java and Bali by farmers, it is apparently a crop that can grow under the coffee trees. But also, the Timorese Indigo version (Taum/Tarum) is good for coloring indigo. The challenge is that the indigo extract has to be made near to the harvest place, because once you cut the leaves, they need to be processed directly in order not to lose the color quality. The wash and light fastness of indigo is very good, which makes it a good color to explore in Timor-Leste.



Picture 12, Indigo vat

For coloring yellow, they use mango tree bark but they also use the heart of jackfruit tree branches, but that is difficult (as it is not sustainable) to source.

For brown they use the bark of the Ceriops tree (mangrove). This is also difficult to source, as mangroves are protected. They source it as a by-product from the wood industry in Papua. The extract is being made in Papua and sent as powder to Bali.

For Black ToL uses the same resources as in Timor, namely rice-field or river mud in combination with a tannin. The resources for the tannin from ToL are different with the once that are used in Timor-Leste. So, it is worthwhile to compare both recipes and see whether the Timorese recipe is just as good as the Indonesian one.

As for cotton, the ToL director mentioned that in many cases the quality of the yarn depends on the species of the plant. For hand-spinning you need cotton with long fibres. But in Timor, during its occupation, Japan has introduced a specie with shorter fibres, which was apparently better for their industry, but it is not a good quality for hand spinning (according to sr. William Ingram).

**Tarum Bali;** While we were in Bali we had been introduced to Tarum Bali, a commercial factory in natural dyed fabrics and yarns in Gianyar. It is a small factory but has the capacity to process hundreds of meters of fabric per day. In order to survive they focus on three different but related business divisions, one is the natural dyeing, secondly, they make handwoven fabric in Java, thirdly they create garments for sales. In the natural dye division, their customers mainly are designers, manufacturing factories and private people.

They follow the principle of being as sustainable as possible, and because they produce many dyed fabrics, they need many natural



Picture 13, shredded leaves in Tarum Bali factory



Picture 14, Tarum Bali's T-shirt label

dye ingredients. Therefore they have developed recipes that mainly use the leaves of the trees, because they are easier to harvest and the harvesting does not affect the trees health. They use four main colors/ingredients. Mahony leaves for brown, Mango for yellow, Indigofera tinctoria for blue and Ketapang for black. They source the leaves from either their own plantations or from farmers and for some species they source the leaves from the government workers when they cut the public trees.

They harvest big amounts of leaves and have a controlled system where they shred the leaves, then boil them in 2000 liters of water, after which the color extract is ready. In the factory only men are doing the work for the dyeing. Women are more involved in the preparation of the fabric, like cutting and dividing the ordered fabrics, and they are involved in the weaving. They use the standing weave machines.

They use the dyes for even dyeing, but also to make tie-dye and other combinations with the colors. Leftovers from their products are being woven into small carpets. But as sometimes customers expect 100% quality of colors, they tell the consumers that they can never guarantee 100% wash fastness.



Picture 15, shredding system

## CONCLUSIONS FIELD DATA COLLECTION BALI

- Natural dyeing takes time (growing resources, creating the vats, testing quality, dyeing, finishing), which makes the craft more expensive and less flexible to demands of the markets. It also takes time to start up a production process cycle, as you are depending on seasons and many factors influence the quality.
- The only products at this stage that need to be resourced from outside of Timor-Leste are the undyed fabric and yarn, PH neutral liquid soap and qualitative Symplocos. But Symplocos production can be boosted in Timor-Leste and in ToL they create their own liquid soap from plant resources, learning about this recipe might be an opportunity as well for the project.

- The quality of the undyed fabric and yarn is important in order to achieve good and even results. Not all yarn and fabric are of a good and even quality. Selecting a qualitative provider can take time, as quality can only be seen during testing. When dyeing fabric, the main challenge is to achieve even colors on the fabric. This needs training (for instance a month training with ToL). It is easier to dye on yarn.
- Natural dyeing in larger amounts is a heavy work and is mainly done by male workers. We need to create ways of making the work less heavy, in order to include women and persons with disabilities.
- Quality control of all the resources that are needed for the dyeing process takes a lot of energy and time, but is needed to guarantee the locality and quality of the products, which provides the extra value of it. It means that the initiative has to stay close to the producers to keep controlling them and their production.
- It is worthwhile to look into cotton production as well, since the cotton is the basic product that needs to be colored and currently local cotton is becoming extinct, as hardly any groups produce their own cotton. Subsequently, current locally spun cotton yarn has a very irregular quality. Having local cotton can add towards the uniqueness of the products that will be brought into the market, and can reduce the need for imported cotton fabric and yarn.
- Skills;
  - need to developed, to become experts, covering as well the science behind dyeing, needs a lot of training. A sustainable team is needed to learn and transmit. This takes time. At least a year to develop them.
  - Indonesia has a lot of knowledge and capacity on natural dyes and can be used as source of inspiration and knowledge/exchange.
  - Indigo knowledge is not present in the country and needs to be developed, as the plant is indigenous and the color is of high quality.
  - Knowledge of high quality Symplocos needs to be extended to upgrade the quality of Symplocos in Timor-Leste.
- Resources;
  - Ingredients for coloring are seasonal, for which it is important to learn how to preserve the ingredients for the season when it is not available. And it is important to organize the production in relation to the availability of ingredients, thus in relation to the seasons.
  - From both Balinese companies we learned that it is important to create a qualitative and sufficient supply chain for dye ingredients. Sourcing of ingredients needs to be a major priority for dyeing on a larger scale. But also, while sourcing and selecting ingredients, sustainability of the trees and plants needs to be taken into account.
  - It is important to find those recipes that only use local ingredients and harvest in sustainable ways, in order to minimizes the environmental footprint (minimize import) and guarantee the supply (even help climate change).
  - The initiative needs to create their own garden and plantations, or start very close collaborations with farmers, in order to control quality and supply.
  - Training and business development needs to be done for farmers. To supply for ingredients. Most promising for farmers is Indigo (also used for cosmetic industry), Symplocos, cotton, wild onions, mango and jackfruit.
- Market;

- It is recommended to focus on the local niche market, as on the external markets you will need to compete with India, Pakistan, Java and even Bali, which are highly developed in this natural dyes.
- Since the markets in Timor-Leste are small, it is important to diversify as much as possible the markets, in order to survive. Both natural dye companies in Bali combine their business models with the creation of local yarn and fabric, as it complements the uniqueness of their products and helps to create business for the weaver groups beyond just the coloring of the yarn. Additionally they developed a production site and sell ready-made products under their own and others labels.
- Promote the uniqueness of the product, including the story, like; locally resourced, providing income to rural groups, contribution to climate change, organically, etc.
- Tourism is a market for ready-made products, and for the workshops and tours in the dye-studio.
- Designers and other producers can provide for a market, for special orders.
- Training and consultancy is a market for the initiative, as SEAC mentioned to have a need for trainers in natural dyeing and other crafts and the local knowledge on dyeing is minimal in Timor-Leste.

## TESTING OF INGREDIENTS AND RECIPES



After learning from the local Timorese weaver groups and from Threads of Life and Tarum Bali, the team returned to the RELOKA office to purchase the minimum equipment and start to test some of the recipes and techniques that they learned. The team has tested seven different colors and ten different recipes.

As we learned from ToL that it is very important to prepare the fabric and yarn before dyeing and afterwards finish it as well. This preparing and finishing, we found, is not taken very seriously by the weaver groups in Timor-Leste (in many times because of no access to water) and thus affects the quality of their dyed yarn.

Black and silver: we tested three variations of black recipes. All based on black mud. Black turns out to be a solid color, it can be washed and is fairly light-fast. It turns out that some fabrics are better for black, as Calico (a fabric that we use for totebags) is difficult, but canvas and a thinner cotton are very good to dye.

Indigo blue: We have tested two variations, one with the Tarum (locally grown indigo plant) but techniques from ToL. The other test was done with an indigo extract that we brought from ToL, which is a different plant species. Although we followed the recipes, our color comes out very pale in comparison to the indigo when it was made in ToL. More testing needs to be done, in order to achieve the best possible results.



Yellow: all together we tried four yellow recipes. We came to the conclusion that the use of mango and jack fruit tree bark make a beautiful yellow. The yellow is difficult to dye in an even color, we need more learning and testing to get even colors. The problem with the Jackfruit wood is though that it is not very sustainable.

Brown: for brown we cannot use the recipe from ToL because it uses the bark of Ceriops (mangroves), which is a protected tree in Timor-Leste. Instead, we used a recipe of the Marenu Tais group and combined it with knowledge from ToL, but the color did not come out very bright. We will try this color again with other variables, as the Marenu group was capable of reaching a very bright brown.

Pink: we have a pink recipe from LO'UD, that uses wild onions, we have tested it and it comes out very well, we think this can be a good color to adopt for further testing. We need to test it with different mordants<sup>4</sup> and still need to learn more about making the color even.

Green: Green is a combination with indigo. After a fabric is dyed indigo, a new recipe is added (we used a recipe from Alola Foundation), based on acids, like limes or vinegar or in our case we used tua asin, a local wine, that helps to turn the blue into green.

Mordant: Until now as a mordant we used Symplocos (shredded leaves from Symplocos tree). We sourced the Symplocos from ToL (they source it from Flores). It is fairly expensive for use on larger scale. But we have learned that this Symplocos tree (Loba in Tetum) also grows in Ermera. The problem is just the quality of the leaves that the community in Ermera collects. As we understood they have never had training about the harvesting of Symplocos and it is very important to know when is the best moment to harvest the leaves of the tree and how to process them. This Symplocos is full of Alum.

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<sup>4</sup> A mordant is a recipe based on alum, that helps to prepare the fabric to fix the color.

After dyeing we have done wash tests on all the fabrics, which showed us which recipes are better than others. We have noticed that washing with a normal washing detergent (Rinso) makes the colors paler than when the fabric is washed with a soft washing detergent (preferably PH neutral), or a shampoo. The testing has been taken place in the office garden, which was temporarily organized as dyeing workshop.

### **Sourcing the ingredients**

We have found many resources to be available around Dili (in small amounts), like Mango tree, Jackfruit tree, Mankudu, Ketapan, Mutu-mutu, Singlari, Taum (indigo), Ai-nenu, Tamarind, Limes, Turmeric. Mainly the ingredients for the color brown need to be sourced from a forest area (we sourced them from LosPalos), the wild onions for pink we sourced from a community in Ossu and Symplocos only grows in Ermera. Nevertheless, the collection of all the ingredients was taking a lot of our time and efforts. There is no availability of resources on larger scale, some weaver groups have started gardens with coloring resources (advised by Alola Foundation and TimorAid), but their resources merely provide enough for their own use. For instance, some groups in Oecusse started to grow their own cotton and they also grow some bushes of Taum. LO'UD has also started a garden near to their workshop and most individual weavers grow their ingredients near their house. But it is difficult to find enough trees to supply for bark.



Picture 16, Temporarily dyeing workspace

Another issue is the sustainability, or in other words the impact on the environment when harvesting resources for coloring of fabric and yarn. When dyeing is done on an industrial base, the sustainability should be considered.

Like with wild ingredients, they need to be farmed, so that their species will be protected, for instance, with the wild onions. Now we have sourced one batch from the weaver group in Los palos and one more batch from a community in Ossu, who harvested it from the forest. But when too many onions are being harvested, they would soon become distinguished. Therefore now we have started to farm a first batch on our planned garden for color resources in Hera. Also, the color source for yellow and brown, is traditionally from bark. When we want to continuously harvest that, we will need to start plantations of these trees, in order to preserve them.

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## **CONCLUSIONS FROM THE TESTING**

- We can say that at this stage we have gained successful recipes for black, yellow, pink, silver and green, that can be further explored. And we can say that we still need more testing and learning on brown and blue.
- The main challenge when dyeing fabric is to get a nice and even color. As ToL also mentioned, this needs qualitative ingredients (good fabric and yarn, qualitative mordant and dye ingredients), good skills (technique for mordanting and dyeing) and dedication, as many factors influence the quality of the colored fabric.
- Resourcing of ingredients took a lot of our time and was a logistical challenge. We did the dye tests in Dili, whereas some ingredients are not yet organized in or near to Dili, as hardly any



weavers in Dili dye their yarn. So, we had to source bags of bark and other resources in LosPalos and sourced local yarn from Oecusse. All these logistical challenges need to be solved or better organized when the initiative decides to create more dyes.

- In relation to the fabrics that we use, the best results are gained with organically handwoven canvas from India (100% cotton), and a thin white 100% cotton (resourced in Bali) and 100% cotton yarn from the shop. The Calico that is available in Timor-Leste (and currently used a lot by RELOKA) is not good for all the colors and it also looks pale very quickly. Application for these fabrics is that Calico and Canvas are very good to use for bags, wallets and hats, whereas the thin cotton can be applied for clothes. We would like to do also tests with linen in the future, as this is a very nice fabric to use for clothes.
- When looking at recipes, we need not only consider the color quality, but also the combination of availability and sustainability of the ingredients. Some ingredients need to be harvest in the morning and directly used (indigo), others are considered “lulik”, which means sacred, it is mostly for a good reason that trees or plants are announced as sacred, for instance because they are poisonous, or they are rare, or they help the communities water source, etc. So before exploiting a sacred resource, we need to make sure there is consideration for the plant or tree and the community.
- Probably the best result of colored fabrics will always remain vulnerable for washing. This is a fact that needs to be considered with all natural colors. A washing advice is important to provide to potential users of the fabric.

## CONCLUSIONS IN RELATION TO SKILLS, RESOURCES AND MARKET

The study focused on skills, resources, market for natural dyes. This chapter elaborates on the combined conclusions that can be drawn from the findings in regards to these three domains.

|                | Conclusion   | Recommendation  |
|----------------|--|---|
| <b>General</b> |  |   |
| 1              | Natural dyeing takes time (growing resources, creating the vats, testing quality, dyeing, finishing, creating extracts), which makes the craft more expensive and less flexible to the demands of the markets. It also takes time to start up a production process cycle, as you are depending on seasons and many factors influence the quality.  | <b>A long-term (3-years) plan</b> needs to be developed, as experimenting with color-vats is a slow process and ingredients availability is depending on seasons and development of agroforestry resources takes time.  |
| <b>Skills</b>  |  |   |
| 2              | Current level of knowledge about natural dyeing is minimal in Timor-Leste. Although weaver groups use traditional recipes, the quality of these recipes is not consistent and does not answer to the needs of modern society. Additionally, weaver groups have no knowledge about the science behind natural dyeing, for which they have no clue about how to influence their recipes. The weaver groups | In order for Timor-Leste to become knowledgeable about their own natural dyes, <b>extensional expertise needs to be developed</b> , probably in a collaboration between private sector, local NGO and government, so that knowledge will be scientifically based, documented and transmitted.<br>Knowledge needs to be sourced from in and outside of the country, for instance, from |

|  |   |  |
|--|---|--|
|  | do still have some knowledge about the trees and plants that can be used for dyeing.  | ToL. ToL provides the option for team members to learn on the job in their center in Ubud for \$30 per person per day.   |
| 3  | National knowledge about the cultural heritage of natural dyes is minimal. Only little research has been undertaken and the few documented recipes are not complete and not systematic. There is for instance no documentation of traditional colors and recipes per Tais language region. This knowledge is disappearing, with the disappearing of old generation Tais weavers, since recently more and more weavers make their colors with synthetic dyes or use industrial colored yarn. | The knowledge about natural dyes is part of the Tais weaving process and thus a cultural heritage. In order for this knowledge to be preserved it is recommendable to start <b>research about all natural colors and their ingredients and recipes</b> , covering all Tais language regions. The findings should be documented and made available for everyone in a book or digital media. |
| 4  | Most promising colors of Timor-Leste so far are yellow, brown, black and pink. Additionally, indigo is a promising color to be developed in Timor-Leste as it uses indigenous indigo plants. But the methods for dyeing need to be improved, including scouring, mordanting and finishing and creating even colored fabric.   | The RELOKA team needs to <b>test the current recipes</b> and select the most successful recipes and ingredients and enhance the quality of the recipes, by use of their ongoing learning process and with mentoring from outside country sources.  |
| 5  | The skills for using Indigo tinctoria for making blue colors are very rare. This plant is in Timor-Leste used for silver and black, but in the whole country Indigo blue dyeing has never been developed, even though this plant is very well available.  | Expertise needs to be developed in Timor-Leste about making <b>Indigo vats</b> . This skill can be learned from ToL or from Japanese Indigo artists. RELOKA could become expert and provide training to weaver groups  |
| 6  | There is no knowledge about preserving resources for other seasons, like making extracts or any other way to conserve the resources or influence the growth of plants. The current seasonality of resources like cotton, indigo and other trees and plants, prevents weavers from providing year-round products with natural and local resources.   | When knowledge and skills for making good dyes are developed, it is important to gain expertise about the conservation of ingredients for other seasons, like <b>making extracts</b> and how to dry ingredients  |
| <b>Resources (see annex 1, list of dye plants)</b> |   |  |
| 7  | Many resources are available around Dili (in small amounts), like mango tree, jackfruit tree, mankudu, ketapan, mutu-mutu, singlar, tarum (indigo), ai-nenu, tamarind, limes, turmeric. Only ingredients for color brown and the wild onions for pink were sourced in more rural areas and Symplocos grows in Ermera. But there is no larger scale agriculture or agroforestry production of color ingredients.   | A <b>supply chain</b> of resources has to be organized in order to assure availability of the resources. The creation of gardens with natural dye plants and or small plantations of ingredients, either near to the natural dye center or with weaver groups who can supply to the natural dye center can help to increase the availability of good natural dye resources.                |
| 8  | Sourcing of ingredients consumes a lot of time and effort from the team. As well as it was expensive, as ingredients had to come from different communities and transported to Dili   | The initiative needs to create their own <b>garden and plantations</b> , and start very close collaborations with communities or farmers, in order to control quality and supply. A color garden in Dili can also serve for educational purposes.  |

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| 9             | The only resources that are <b>not</b> available in Timor-Leste at this moment are the fabric and yarn that needs to be colored, good quality Symplocos and a PH neutral soap. All these resources can be purchased in Indonesia. But in the future the creation of good quality Symplocos and the creation of PH neutral soap can be developed in Timor-Leste, with proper training.  | All these ingredients can on the long-term partially or totally be developed and sourced in-country. The community that grows Symplocos in Ermera needs to be further trained, a soap can be made from local resources (ToL has a recipe) and in-country yarn and fabric production can be developed in the long-term.  |
| 10            | Many color ingredients are currently harvested from wild trees and plants, for which they cannot be used for industrial dyeing, as large-scale harvesting of bark and wild crops will kill the crops and trees.  | <b>Sustainability</b> of ingredients has to be taken into account when choosing for the recipes to be used for coloring. It is important to find those recipes that only use local ingredients and harvest in sustainable ways, including cultivating the production of ingredients, in order to minimize the environmental footprint (minimize import) and guarantee the supply (and even help climate change).      |
| 11            | Symplocos (an important source for mordanting) is available in Timor-Leste, but extensional knowledge about its harvesting and processing is not available in Timor-Leste. There has never been any training provided about it.  | <b>Promote national Symplocos production.</b> Investigate the quality and quantity of Symplocos trees, create community cooperation, train the community and control the quality.   |
| 12            | Taum is an indigenous indigo plant in Timor-Leste but not really used for creating indigo blue. Currently women use little bits for silver and black. But when indigo dyeing will be developed, the supply of taum will not be sufficient.   | It could be further explored whether it is possible and there is motivation amongst weaver groups to <b>grow indigo on larger scale</b> . Investigate which areas are best to grow it, create community cooperation, train the community in growing and harvesting taum and in making extracts.   |
| 13            | Although cotton is not an ingredient for coloring, it is the base material of a Tais that needs to be colored. But less and less weaver groups grow their own cotton and Futus makers and other weavers have more and more difficulties in finding supply of locally grown yarn. Local groups stop growing it, because they feel it is easier to buy the industrial yarn from the shops. Additionally, good cotton fabric is not available in Timor-Leste. | A new approach, like small industrialization of production of local cotton, yarn and fabric, can help the farmers to continue or start growing cotton on a larger scale. This includes the industrialization of farming, spinning and weaving of locally grown organical cotton for a niche market. This should be approached as a separate project (for instance, following the model of the Bambu center in Tibar). |
| <b>Market</b> |  |   |
| 14            | The market in Timor-Leste is small, as the population is small and poor and the tourist market is too small to rely on. The main market is currently the expatriate community, private sector companies, NGOs and government. Subsequently, it is difficult for Timor-Leste to   | It is recommended to focus on the <b>local niche market, promoting the uniqueness</b> of the products, as on the external markets you will need to compete with India, Pakistan, Java and even Bali, which are highly developed in this natural dyes.   |

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|    | compete on the international market, because of the scale and prices.  | Promote the uniqueness of the product, including the story, like; locally resourced, providing income to rural groups, contribution to climate change, organically.   |
| 15 | The initiative has opportunities in different small market segments; Tourism is a market for ready-made products, and for the workshops and tours in the dye-studio. Designers and other producers can provide for a market, for special orders. Local weaver groups can provide for a market for pre-dyed yarn. | Since the markets in Timor-Leste are small, it is important to <b>diversify</b> as much as possible the market, in order to survive. <ol style="list-style-type: none"> <li>1. Produce yarn, fabric and ready-made products</li> <li>2. Provide touristic workshop</li> <li>3. Provide trainings and consultancy</li> </ol> |
| 16 | The SEAC is very motivated to preserve traditional handicraft techniques and has a need for training in traditional embroidery and natural dyes. Also, Alola Foundation and TimorAid also mention the need for better training and more expertise in natural dyes. And UNESCO sees changes for promotion.        | <b>Training and consultancy</b> are a possible market for RELOKA, as SEAC mentioned to have a need for trainers in natural dyeing and other crafts and the local knowledge on dyeing is minimal in Timor-Leste and no other institution has yet been able to take it on.  |
| 17 | Local groups can only buy Symplocos/Loba through the group in Ermera or through Alola Foundation. They sell one kilo leaves for \$25. But this is a low-quality product for a very high price, considering that it is not yet processed. (While in Flores it is sourced for less than \$4 per kilo)              | It is an opportunity to <b>re-develop the exploitation of Symplocos</b> and create a better product for a fair price. Additionally in the future Indigo production could also be developed.   |

## GENERAL CONCLUSION / PLAN OF ACTION

### Need for an expertise center in natural dyes

After this feasibility study it can be concluded that there is surely a need for an expertise center in the area of natural dyes and although modest, there is a niche market for natural dyed items.

As key-stakeholders have stressed out, the need is in the area of:

- Marketing, promotion and quality improvement of traditional Timorese natural dye colors (through natural dye products and workshops for touristic purposes);
- Transmission of color knowledge (through development of natural dyes expertise, research, including education/training center)
- Preservation and cultivation of color trees/plants (including a nursery/seedbank/botanical garden but also creation of supply chain);

Additionally, these activities can also provide for economic empowerment of weaver groups, the expertise center provides an answer to the discussion of climate change by promoting local production and replanting and conserving of indigenous trees and plants, and RELOKA internalizes GEDSI principals, by establishing gender-equality through promoting a women led industry and the inclusion of persons with disabilities in the project.

### Mission for the future



|   |   |  |  |  |  |  |  |  |  |
|---|---|--|--|--|--|--|--|--|--|
| 1 | Color garden and dye center established       |  |  |  |  |  |  |  |  |
| 2 | Team is established                           |  |  |  |  |  |  |  |  |
| 3 | Team is trained and experienced in new skills |  |  |  |  |  |  |  |  |
| 4 | Supply chain is developed                     |  |  |  |  |  |  |  |  |
| 5 | Market is approached                          |  |  |  |  |  |  |  |  |

Possible partners for collaboration

We see opportunities to work together with at least 3 community groups, for supplying the expertise center with ingredients and be involved in the learning process. With the current knowledge we would recommend to work with the community

- In Ermera that grows Symplocos, on increasing the production and quality of the Symplocos.
- Tais Marenu in LosPalos, for cultivating ingredients and fair exchange of knowledge and production work
- Taum Abas in Oecusse for developing the cultivation of cotton and Taum





For collaboration in the area of conservation and transmitting of knowledge and skills there are opportunities to work with SEAC, MAF, Timor AID, Alola Foundation, UNESCO and UNWomen.




And for the promotion and marketing of natural dyed products we can collaborate with MTCI, Weaver groups, RELOKA retail and Things & Stories.

## ANNEXES




### ANNEX 1, LIST OF COLOR TREES




#### Resources to be used for natural dyes




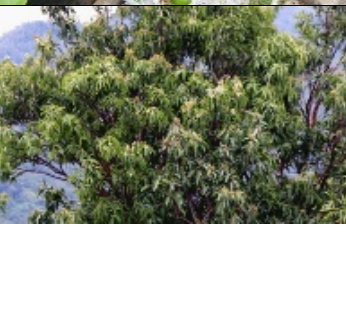
| English/Tetum/<br>Indonesia/Latin                 | where is<br>grows   | picture  | Function   |
|---|---|--|--|
| Pomegranate/Roumao /<br>Delima/Punica<br>Granatum | Grows in<br>dry, loose<br>grounds, as<br>well in Dili                         |    | To be used as a<br>tannine, but<br>traditional in Timor-<br>Leste people do not<br>use it. You use the<br>skin of the fruit  |
| -/Ai dak/-/-                                      | Grows in<br>many places,<br>we find in<br>Dili (beto<br>tasi) and<br>LosPalos |   | This wood is for<br>making ash that is to<br>be used for washing<br>the fabric. any hard<br>wood can be used,<br>but this one is<br>advised. You burn<br>the tree trunk or<br>branches |
| -/Mutu-mutu mutin/-/-                             | Grows in<br>many places,<br>also in Dili                                      |  | Tannine for black<br>color, you use the<br>leaves  |
| -/Silari/-/-                                      | Grows<br>everywhere,<br>also in Dili  |  | The leaves can be<br>used for black  |


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|  |                                       |    |   |
| <p>-/Kali vele/Ketapang/<br/>Terminalia Ketapang</p> | <p>Can be easily found everywhere</p> |   | <p>It is used for brown and black, the bark is used</p> |
| <p>-/Ailok/-/</p>                                    | <p>Grows everywhere, also in Dili</p> |  | <p>The bark of the tree is used for black</p>           |



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| <p>Indigo/Taum/Tarum/<br/>Indigofera tinctoria</p> | <p>Grows in loose, limestone ground, a bit dry. On slopes in Hera, LosPalos (Mehara) and Oecussi, but probably almost everywhere</p> |    | <p>The leaves are used to extract indigo color, blue. The leaves need to be harvest in the early morning and directly extracted</p> |
| <p>Turmeric/Kinur/Kunyt/<br/>Curcuma</p>           | <p>Generally available in Timor</p>  |   | <p>Used for yellow, orange, red and green</p>   |
| <p>Tamarind/sukaer/-/<br/>Tamarindus Indica</p>    | <p>Everywhere</p>  |  | <p>Tamarind is used as an acid and fructose for indigo</p>  |

|   |                                     |  |  |
|---|-------------------------------------|--|--|
| <p>Mango/Has/Mangga/<br/>Magnifera Indica</p>                                   | <p>Almost everywhere</p>            |    | <p>To use the bark of the tree for yellow. Tarum bali uses the leaves of the trees</p> |
| <p>Jackfruit/Kulu zaka/Nangka/Artocarpus heterophyllus</p>                      | <p>Almost everywhere</p>            |    | <p>To use the bark for yellow, together with Mango bark</p>                            |
| <p>Indian Mulberry (or Noni)/Mankudu (ai-nenu)/ Mengkudu/Morinda citrifolia</p> | <p>Generally growing everywhere</p> |   | <p>Roots and bark is used for red</p>  |
| <p>Papaya/Ai dila/Pepaya/Caricaseae</p>   | <p>everywhere</p>                   |  | <p>Leaves are used for yellow</p>  |
| <p>Wild red onions</p>  | <p>In the forest</p>                |  | <p>To be used to get pink</p>  |

|                                       |   |  |  |
|---------------------------------------|---|--|--|
| -/Kandola/-/-                         |   |    | To be used in pink   |
| Wild beans/Kotomoruk/-/-              |   |    | The leaves are used for green  |
| Lime/Derok/Deruk/Tilia                | anywhere  |   | Used as acid for green   |
| Symplocos/Lobuskai)/-/-Symplocos (ai- | In Ermera is a community that grows these trees and in LosPalos it also grows. Grows over 600 meter |  | This is used in Indonesia as mordant, for all colors except indigo, also used in red in Timor-Leste. |
| -/Ulumeru/-/-                         | Lospalos  |  | Bark of the tree is used for brown by group Marenu   |
| -/Moro/-/-                            | Lospalos  |  | Bark of the tree is used for brown by group Marenu   |

|                          |                         |  |   |
|--------------------------|-------------------------|--|---|
| Black mud/-Tahu/-/-      | In rice fields          |  | For dyeing black  |
| Limestone powder/Ahu/-/- |                         |  |   |
| Mahony/-/-/-             | All over<br>Timor-Leste |  | Used for brown by<br>Tarum Bali, they use<br>the leaves |