**C1 - Interview Cheetah Conservation Foundation Otjiwarongo 31-1-2023**

Throughout the world to try to keep Cheetahs alive, we have worked with colleagues from Algeria, South Africa. We have been to Iran. We have had Iranians here for training. We have our major field base here, we have our satellite field base in Somali land, not to be confused with Somalia. And we are the people who were behind taking cheetahs to India.

The reason we are involved in biomass is because here in southern africa, and indeed throughout parts of the world, there are problems with the overgrowth of some of the native thorny bushes. This is commonly referred to as bush encroachment. The bushes however are native and they should not be eradicated. But due to man’s poor management, there is a huge imbalance between woody biomass and grasses in this part of the country. We live in what should be a mix woodland, Savanna. None of you are ecologists so I dont have to go into this far to this part of the field or get challenged. but there is no perfect balance between grass and woody biomass but what we can say is it appears completely out of balance compared to past years due to the influence of the farmers as we call a rancher here in southern Africa, overgrazing, refusing fires on their lands and removing the native herbivores would’ve kept the bush open. The rhinos and the elephants and the farmers do all this because it interferes with keeping livestock which is their livelihood. Now since, due to their poor mismanagement, the bush has overgrain the grass, and they dont have as much grazing land to raise their livestock. They get grumpy and they can't afford any economic losses, so they take it out on the predators. They blame the predators for all their losses.

The cheetah is a little bit more active on the crepuscular end of things, dusk and dawn. They are more likely to be spotted and blamed for a loss to a predator even if they have nothing to do with it. But nonetheless, the farmer take it out on the predator. So in an attempt to improve the farmland economics, so that the farmer wouldn't feel nasty with the predator, we decided we had to help the country with their bush encroachment problem. So we wanted to help put a value on the biomass. And in our case, we wanted to show that you can do this without impacting the large trees such as the charcoal industry historically is done. There is a charcoal industry in the country. We said okay, they got that niche kind of covered. We dont necessarily like charcoal, but that's the way it’s done. We wanna come up with a process where you can utilize bushes of any size. And that means you harvest them, you grind them up and then you refigure them into something much like wood pellets that are used for the global biomass trade.

In our case, it was cheaper to capitalize a wood fuel briquette factory that is capable of a giant pellet. And so we got a grant in the early 2000s to establish a wood pellet factory. And then we established an integrated biomass business. We ourselves have 58 thousand hectares of land that we manage with an easy average thinning offtake of ten tons per hectare. We have more biomass than we can ever envision using. And we harvest it, we chip it in the field to reduce it logistically to transport it to our little factory that's about a kilometer from here, you’ll see. And there we process it into the wood fuel briquette. We employ about 30 people directly into this process. I think maybe it's 34 at the moment with a very slight edge to women. I think it’s 17 to 15 or something like that.

So we are cognizant of gender equality which is always an issue in modern social studies. And we have another variable number, 10 to 30 that get part-time employment. That one is doing harvest and chipping. We did this as kind of a loss leader, hoping people would copycat us and build up other biomass industries that would utilize even more bush. We were pleased to see people in Oklahoma copycatted the wood extrusion plant that they gave up after a while because you can't really make money on it easily. And we’re in the middle of nowhere. Remember, all biomass is logistics. Comes down to shipping, whether it’s internal before you process it or its external after you process it. Our major clients have been south Africa because we get cheap transport because everything’s made in south Africa and trucked up to Namibia and the trucks need loads going back. We would occasionally get into Europe because people loved our story of they’re trying to open the bush to help the farmers and save the cheetah. But our clients would have it one year and find they couldn’t get an increased margin on it to pay for the extra transport because like everywhere, their clients were more concerned about economics. And wood fuel briquettes are made in China and Ghana and Poland, India, the Netherlands, which used to be the Netherlands, themselves made a lot. So we’d be in and out of Europe until lo and behold, Mr. Putin invaded Ukraine and the global fuel economy tanked. And our European colleagues contacted us and said, no debate, no negotiation. We’ll pay you everything you want, twice what we used to pay, give us bush blind. So now we’re shipping back into Europe and our Oklahoma buddies cannot restart because I bought all their equipment when they closed down.

So that's where we are and who we are in a nutshell.

**So you said you employ 30 people directly in the bush?**

Thirty-three or four-something, I don’t remember. We employ a hundred and forty people here in this campus. We have another group of 15 or so in Somali land.

**And you said they are mainly women?**

No no no. it's almost an even match but the women have a slightly, as it happens.

**Do they do manual harvesting or?**

No can’t find any that would put up with that. It's hard to find men that would put up with that. So the women generally belong to the processing.

**And do the workers, do they live here or ?**

No. Long ago we convinced them to live. Having workers here is a problem because we’re resource limited out here in our water and electric and the workers want to have their extended families. And then, oh you know, i didn’t tell you before, but now my kid’s sick and it’s Saturday night and you’ve got to take it to the hospital. And so long ago we paid off as many workers as we could to go live in town so we don’t have to deal with them. We have some workers living on site, but the entire bush team lives in town, in Otjiwarongo and we provide the transport to bring them in and out each day.

**And do they have, like, a fixed contract?**

They have standard Namibian contracts, yeah. We can show you an example even if you like. We are Forest Stewardship Counsil inspected so they go through all this each year and give us a certification. They look at the contact, they look at how we paid our employment taxes and everything, in addition to interviewing the workers to see that they aren’t abused and that feel valued and all this good stuff.

**What do you think about this process?**

You can tell. I think, its yeah. I’m not sure it adds value to our process, it adds value to our processes. So in that sense, I think it is valuable. It doesn't add value to our sales which everybody else claims it does. But no, our big clients don’t seem to care one way or the other.

**Not in Europe either?**

Occasionally, but you’ll find out. You can also find European clients that really don’t care. But it is good. It has been valuable. Makes us think about things to clean up and tighten up. We wouldn’t have thought about otherwise.

**Like social things?**

No, generally, it’s been eyeballs on stuff.

**You don’t think of, like, bundwall around a storage tank? Like safety issues?**

Yeah, a little. Or, Gee, why aren’t you posting more about your workplace procedures?

So people know and think of safety all the time, blah,blah, blah and things like that.

**What safety measures do the bush workers have now?**

Standard PPE, which is one of the issues with working in this environment. People don’t like to use PPE and the FSC inspector comes and says, I have to write you out because they’re not using it. And we go, they don’t want to use it? And they go then you should discipline and fire them. And we go, well, that isn’t that easy in our environment. But they have standard PPE. They don’t want to use the PPE because its too hot.

**Why do they not want to use the PPE?**

Too hot? who know why. It varies. We had one guy write us up even, because everybody should have had a baseball cap to wear. Nobody wanted to wear a cap out there.

**And the bush harvesting is it done manual or?**

No it used to be manual but what you saw probably, was our chipping crew gathering the harvested bush up and chipping it. We do a teeny bit of manual harvest just because we’re good guys for employment, but vanishing little anymore. Most of it’s mechanical machinery with the shears much more efficient. Manual bush harvest is a losing proposition economically.

**And what have been your major challenges?**

We have a problem finding reliable people year to year that want to do it because if you just turn unknown employees, contractors lose in the field, you have problems with they don’t maintain a good field camp, they have their dreams everywhere, they set up poaching, they don’t pay attention to their cook fires, stuff like that. So finding reliable should be another word i want. But staff to do the harvest had been a big issue. It’s the same with the chipping crew. This is hard work, nasty work, and its hard to find people who are reliable to do it. And if you try to contract it out and pay on, productivity becomes the least common denominator thing. If one man on the crew is holding them up, how do you penalize the other four? Because they’re not producing enough? Its very very hard to come up with a fair way to pay people for the raw biomass and that’s why we ended up being vertically integrated. They’re all our employees so they’re all paid at hourly rates, they're not paid for production. Try now and then to add off add on incentives

Actually, we still do, it’s helpful, but it doesn't get us around. The basic problem of, the main answer to your question is lack of productivity in bush harvest. That's been our major challenge.

**Okay, what kind of add-on incentives for that?**

Oh for tonnage, if the crew brings in 3 trailer loads of chip bush a day instead of 2, theoretically they’re due for a bit of, bonus isn’t a good word, but I guess it is at the end of the month or whatever. If the factory produces 20 tons instead of 18 tons, maybe they’ll do semantic compensation, but it gets very hard, because it really isn’t fair. You’re rewarding even the slugs for holding the rest of them down. Very difficult.

**And how are your wages compared to other?**

A little bit above the basic farm hand wage, but you can just plain ask the guys, they’ll claim its horrible. Then ask them why’re you here? Do you get a better offer anywhere else? wages here are pretty good.

**but still its hard?**

yeah.

**And other people you employ, are they from the Otjiwarango region?**

Mostly, some of the seasonal crew that comes in for harvest and little chip are from other regions, but mostly they’re Otjiwarangorites now.

**So you mentioned productivity and finding the workforce as a challenge compared to other challenges?**

Well. economics is a challenge. I mean this is a low-margin business and we’re in the middle of nowhere so the transport costs kill us.

**But you see now the Europeans wanting your product, that’s going better?**  
Oh yeah. If this keeps up we’ll make money or at least break even.

**Because they’re paying more now?**

Well, they’re paying more now. We have contracts now that pay over twice what we used to get it up there.

**And who are these clients?**

Generally, they’re just charcoal distributors or wood fuel distributors. You’ll find a broker charcoal or some of them are retail wood pellets, wood fuel briquettes like ours. Sometimes raw wood. They’re barbecue people that have a fancy barbecue wood chain, stuff like that.

**So no bioenergy? Biofuel kind of?**

That's a bigger volume and they don’t want a briquette, remember? They want a pellet or a chair. We are involved at the moment with a disgustingly large EU project with 14 other partners to establish a Torrefaction plant. food up enough, you know what Torrefaction is? And that of course is aimed at industrial markets.

**Okay. And the plant is to be located?**

The pilot plant is here.

**It’s here?**

It’s here on the yeah, but it’s a pilot plant. It’ll only produce 250 kg an hour. The designers believe for it to be economically viable, it has to be about six or ten times bigger. So it’s still a pilot plant.

**You called it as a nasty project. Why?**

Because i have 14 other partners many of whom are concerned about gender equality, and its very messy. It involves NBig and NUS within country. And its so messy that NUS became a mess. NBig had to pick up a postdoc that’s supposed to be a NUST. Things like this.

**How do you monitor? Like sustainable harvesting?**

FSC. Matti and David are the monitors there. They’re both trained at their undergrad level in country, so they’re very up on what one bush should switch.

Matti’s an expert on this. He’s just completing his Ph.D. in forestry in Finland. David’s about to be accepted in a master’s program in biomass studies. So, day to day they can monitor the crew. And of course as part of our FSC inspection, the FSC auditor comes once a year and wanders around and goes hey.

**And you also have someone from the Ministry of forest coming here to monitor?**

We should have but they don’t get out of town. We like them. they don’t get out of town much. When they do come, they’re blown away happy with us compared to other stuff. We rarely see them.

**And does the conservancy also include communal farms or communal areas?**

There are 2 different type of conservancy in the country. There are commercial or so called freehold conservancies of which we’re one because we are commercial. And then there are communal conservancies. Communal conservancies are not really involved in this but these are better questions for people like NBig who are more broader in this because they can’t really get the permits out of forestry because forestry doesn't trust them. We tried years ago to have a project starting, some harvest over there. And they couldn't get a permit because the resource is owned by the government. In the communal conservancy, the government retains ownership of all the resources. And it’s kind of clunky here on a freehold conservancy we own and we can do what we want.

**So maybe I can show you the image concept that we are working on**.

The bio hub? Yes. the bio hub. Supposedly there’s supposed to be a bio hub in Otjiwarango. Yeah. Belief is there is. Nothing happened. right, Andreas, anything happened there yet? Did those guys ever get that containerized? But some guys paid for that containerized wood pellet feed plant years ago that never showed up. I got to remember. I don’t remember but yeah, gee, this is news. We’ve never seen this before. No, of course we’ve seen this stuff before. Okay.

**The concept is you have multiple communities here so which is in the green and then we harvest the biomass, namely the bush from there and then we process them in a centralized facility. So we are looking at a technology called hydrothermal liquefaction. Its like pyrolysis, pet pyrolysis. You put biomass and water for high pressure, high temperature. You get majorly bio- oil and bio-char. Apart from that you get off-gas in the off-stream and aqueous phase water stream but we lose water and the gas within the processing plant for energy. And then the bio-char that we get are based on its properties which we don’t know yet, it can be used either as a soil amendment for fertilizers energy generation. If you burn it, you can still produce electricity or as an activated carbon for water purification. So this is something which can be returned back to the community and distributed accordingly. And then the main product of interest, the bio-oil, it has to be upgraded and then used in ships. So this is the concept we have been working so far and then when we use these kinds of a small decentralized location where either wood chips is produced or wood pellet is produced, if you have lot of you know how to say a lot of these individual facilities can feed them one big refinery. It can be Otjiwarango or it can be in windhoek and then the whole refinery setup can be involved with bay. So this is the connection. But also this local biomass can be used for other purposes as well, like electricity production in case of NamPower because NamPower still needs woodchips right?**

If they ever finish that thing. We actually have 2 small biomass fuel power plants on the border total of 50 kw. But yeah we’re a technology demonstration center for the biomass industry that’s ours. And we’ve produced a little bit of bio-char but not much yet. But offhand another way to look at it is just plain if they could get the economic feedback we use the bio-char to get carbon feathers.

**Yes, indeed. That also can be taken part of income and those kind of things. So also DV can benefit with multiple projects like even steam bio is using wood chips. So if you have a large wood chip stuff, then you also get benefited from economy of scale, so on and so forth. So the first question to you is that and you already mentioned that this concept is not really new to you, but maybe i would say that**

We actually mentioned it a couple of decades ago, and then other people took it forward and think they came up with the idea here in Namibia to start it in Otjiwarango. It’s not really new to us.

**Then first question is, what would be the major challenges for having this kind of thing?**

Well, it’s the logistics, the economics. For instance, we’re not going to ship our product to Otjiwarango to be processed. That’s a lost loser for hours so it’s great if other people want to establish a biomass hub in Otjiwarango but will have no use for us. It’s all logistics. To be viable, each provider, each resource is going to have to have a chipping team in the field. You can’t haul raw, unchipped bush from the field to Otjiwarango and make money. I just can’t believe that.

**But you don’t have small pilots here, right? So you said you would have small installations here for producing biofuel.**

I’ve got everything. We do everything here except biofuel. We don’t have a refinery. Might have in future , you never know. But yeah the main, the hang up to the bio-hub so far is finding enough clients who are willing to economically bring bush to the hub. I mean every farmer is willing to bring in raw biomass if you're going to pay them enough for it. But if you're trying to make the bio hub productive, you've got to pay a reasonable rate. And it really isn't reasonable to transport unchipped bush through the country.

**And do you see any other challenges apart from it?**

You get near a city, a lot of people don't like the smell of cooking bush. I know that has been a problem. In the Netherlands years ago, there was one guy who thought that was the wood fuel briquette king of the world. I can't remember his name at the moment. Another lander we dealt with off and on.I believe he had a lot of problems with his factory being moved because people would complain about the smell of cooking wood.

Peter Paul, was that his first name? Peter Paul?

No, can't remember the guy. I can look him up. And actually in Otjiwarango, they're proposing to put this on the site of an abandoned cement factory. One of the reasons the cement factory was abandoned was people complained about the pollution and smell of the cement factory years ago. So we shall see.

**How about you? Do you know this concept?**

We've heard about it and nothing happens. They call it the biomass. I think the challenges that he mentioned are valid. Unless you like what you said, you can't really transport bush without paying cheap, without the then also with the transport cost, the further you go, the more expensive you get. So it's just the free process somehow at your location just to make the logistics of transport more affordable. It can even be things like balers, but those generally only work on energy crops, which are softer woods. Our bush is very strong, very dense, and you try to put it in a baler, you'd have to use heavier twine, I guess you'd still call it, when you worry it's a twine of pollutant, you got to get rid of it. So it's logistics, logistics, logistics.

**But also, on the other hand, I can see that existing value chains because your end product was either wood chips or wood briquettes.**

Right.

**But then at the moment so that also plays a crucial role in the economics. If you change that end product, if you have a more value added product, then your economics changes drastically.**

Right.

**So I also see that as one of the things if you have multiple products coming in that changes things, then whatever the economic flows goes back. So the starting point will be much higher than what's being currently used right now. Okay, that's interesting. And also, do you see any of the challenges in terms of social perspective? I mean, let's say, for example, you said bringing in the people willingness to find the supplier to bring in the biomass to their biohub. Do you think that's one of the biggest challenges? Is it in terms of**

Doing it affordably is a challenge. Most of the farmers have enough transport. They don't all have chippers and stuff to reduce the biomass you get into it a debate with them always about the value of the biomass. When an individual landowner hears about a bio hub and the bio hub is going to be developed and we'll take your bush, they go, oh, that's great, I'll sell my bush. Whereas the bio-hub should be thinking, no, I'll clear your land and won't charge you, but I get the bush. And so the problem is contracting because the farmers aren't stupid and they'll maybe sign a short-term contract that says, yeah, okay, we'll see how this goes. I won't charge you, you can take my bush. But then a year or two down the road, when it turns out the bio-hub has invested €100 million euros and needs a standard supply of biomass, the farmer goes, sure, but now there'll be a slight charge for each ton of biomass you want to take from me.

And another thing that I'm also going to add on is maybe it will be a question of whether harvesting itself out there, whether it's going to be certified or not. If you have some cars who are certified and then some that are not, you end up having contamination and erosion of the whole what it's supposed to be.

**And they might not be willing to get certified?**

No, nobody wants to. Somebody who's not safe.

We have farmers all the time wanting to give us bush, actually wanting us to come harvest their bush. As I said, we're in a situation, we have 600,000 tons of our own raw, unwanted, woody biomass to deal with, so we don't have to deal with them.

**But otherwise the certification would be an issue?**

Well, it depends on who's operating the hub. I would think it would be an issue because it's very hard to follow up on. It's expensive to be certified.

**Also. How long did the process take you to become certified?**

Just a few months. Once you do natural application, once you get your, generally most people do it the way we did, and you say, okay, I'll get FSC certified. You find a consultant of Forest Room. That's their business. As they go around setting you up, and they come in and go, okay, here's all the documents you're going to have to have. Let's put all those in a folder. Then finally you get ready for your initial inspection and the auditors come in and inspect stuff. And that's kind of it. Yeah, it isn't all that difficult.

**Okay. This kind of concept, do you see any threat?**

like this causing to the local system or you mean like to be over-harvesting or anything? No, I can't see any downside to it other than my doubt that it would be economically viable.

**We would also like to understand different stakeholders involved in biohubs like this and their relationship between them. A lot of them almost like power, interest grid. So their position in terms of the power that they have to make decisions or make things happen and they're interested like this. I'd like to ask you to take a look at it to see what you think about high power, high interval.**

People not really interested and in the power. It's a time, like the government can impose policy. Farmers are allowed to harvest, so they have a high power because they can make change. Okay. So, yeah, the higher the power and the higher the interest, the more powerful you are in this value chain. High power, high interest.

Who's a biomass collector?

**Yeah, like companies that would come in and transport the biomass from the field to there.**

Okay. A corporate entity.

**Also, just to let you know, some of the actors might be overlapped here. Like, same entity can do for all the things, but we just want to do reality.**

So that would be the transport. Right.

**Collector. Some people just harvest. Right. And then there'll be one another person who comes and collects all the harvested biomass and then harvest. Take it to a chipping factory or something like a contractor.**

Yeah, something communication platform by that one.

**That's something like NBig.**

Okay. Yeah, I think that looks about right to me.

**And where does CCF comes into picture?**

Yeah, well, we're a Bush well, we're a little different, aren't we? We are a bush processor. So definitely we have high interest in things, but we have the power of a commercial farmer. So we're kind of up here, if not a little bit above.

**And would you see a role for CCF in this?**

Gets very out of saying. Advisory. I have to talk to people like you all the time. Right. I think advisory would be the turn to take home. Okay, how's that?

I just wanted to find out about this local community. They have low power. Low power. They have high interest because they can make money out of it, etcetera. So they'd like it to happen. The power, is that to do is it to do with that or if it's to do with that? I shouldn't speak for them, but I would say it's low power because they can't influence the offtake because they can't get permits and stuff. Whereas the commercial farmer has much higher power because she or he can actually sell that bush to give some power. Yeah, but we have community forest. Oh, Jesus. You can't harvest in a community forest, man. At least not from bush. There's sort of like this debate you can there was sort of like this debate about, you know, with the conservancy that they cannot utilize unless they are part of yeah, you're right, Marty, but even then, I don't think they're getting permits at the moment, are they? Technically, they can they can.

**Do you know, some examples where they differ?**

I cannot give you specific examples, but let's look at, for example, if, you know, these people are not involved in making bush to see which is sort of like a new value chain. Yeah, I'm just kind of like thinking of yeah, and they do that in the community forest. Or they can do if it is yeah, because there was sort of like that challenge of, no, you cannot have it unless you have gone through that challenge. And I'm not sure if now they are now in that whether this was a specific permit given for that.

**I have a question. So CCF primarily also its main focus is wildlife, especially Cheetah.**

Right.

**Then how does the management look about having an interest in biomass valorization and bush control? Like, how does it fit?**

In favor. Because it will improve the farmland's economics, which will improve the farmers tolerance for predators. That simple. That's why we're into it, is trying to keep the farmers happy so they don't feel they have to take it out on the predator.

**And it's not to open up the range and [positude]?**

a little, but that's kind of minor. I shouldn't say it's minor, but I wouldn't call it as big as trying to improve the economics, trying to establish a viable, sustainable biomass industry that improves the farmland economics.

**So you have different farmers that are part of the conservancy?**

We're 8 farmer, we're in a conservancy. But we ourselves have what are technically registered farms. We own ten of them. And that's where we come up with 58,000 hectares we're a big landowner.

**but you don't have different owners, people on the farm?**

We own 58,000 ha. It happens to sit in 100 and let's say 50,000-hectare conservancy. That's waterwell conservancy. Yes.

**So the farms that you have to keep happy, there are where are they?**

Throughout the country. We work throughout the country with grumpy farmers. Take it out. Some predators. You should have seen the discussion. Grumpy farmers, grumpy farmers blame anything except their own their own methodology. Yeah.

**Last question. So you have said that there was a biomass industry park. There's also a lot of project pilot projects going on in this yeah, this farm, it's CCF and what I see is there is something lacking or something has to be done differently to take this to the next level. Or this could be also one of the projects which either to get stopped pilot or just, I don't know, cannot come to realization. So my question is what do you think should be done differently or learned from the previous project so that this can happen?**

kind of a nice open-ended question, right?

**Yeah. It's out of the expertise from your involvement in the projects, only you can let us know because those are the hard-earned learned lessons from those kind of projects. For example, one of the questions I still ask is like the biomass industry part, which apparently came out around eight years ago or ten years ago, I don't know, even five years ago? What made it stop or click, what's the reason?**

It just economically, I believe they haven't figured out how to make it viable again due to the logistics or finding clients who would agree to establish something on the biomass park. I mean, are you going to agree to establish a biorefinery on the Otjiwarango biomass park without having any assurance of how much raw biomass is going to come in or what the electricity is going to cost long term, etcetera, et cetera? I think it's all coming down to economics finally. We're apparently about to get our first wood pellet factory in the country we've been angling for a couple of decades now. So it just takes time. There again, that won't be established on the Otjiwarango biomass part because logistically it's better to put it boom right in the middle of a heavily over-bushed area where you've got surety of supply for a long time

**And you don't see the technical skills of people as one of the challenges or something like that?**

I don't know. And that's one of the issues with this. People always say, oh, the biomass industry will come up and it will create tens of thousands of jobs. Well, no, it won't because people aren't it's not economically viable to harvest by hand. So you only have a few people in the value chain, you know, doing mechanized harvest and transport and we have those skills in country operating a refinery and stuff. We have people coming up with those skills and countries. So no, I don't see a skill set deficit. That's not a big issue in my life.

**And based on your previous experience in clearing this bush because bush, okay, bush thinning is one thing and then post-management after care is another thing. So what were the challenges you faced on that? Because when we drive around, I saw a lot of farms cleared by mechanized versions. But one of the aspects you were heard from opinions is that when you do those equipment harvesting, you also disturb the seeds and pretty much spread them out.**

Right. We have experts here.

**Yeah. So how do you make sure regrowth doesn't happen? Or how does it you keep in check because that's something that's really crucial, based on my understanding. Right. Because bush thinning is one thing, after care management is another. Or does it, they're just going to follow up immediately?**

I'll just from our experience, yes, when we do the harvesting, we immediately treat the stumps with a herborocide which has a chemical called Picloram and that actually suppresses the regrowth. It suppresses, normally it will kill, basically, but you will still have natural regeneration, which is more dependent on the environment itself and it is a slow process. However, there will come a point where you need to reharvest, which probably will be 15 - 25 years later. So you don't just harvest and you think everything is done, you still have natural regeneration, which happens in savannah ecosystems anyway.

**Yeah. And if this regeneration happens, is it of the same species or some other species takes over? Let's say, for example, you have Mellifera now, you chop it down, the next one coming will be still Mellifera?**

Generally it should follow the dominant species in the area, but you might end up having some if you remove too much or let's say if you do too much ecological damage, then you can have another species coming in which is less dominant, but generally it should follow the dominance species that are present in the environment. Okay. Aftercare is expensive. It is actually one of the challenges that you get that you can have.

**And is it expensive because of the chemicals involved or why is it expensive?**

Mainly the product cost. You also have to have an applicator and stuff, but it's mainly the chemicals. And that's part of our FSC accreditation problem. FSC is very strict on what chemicals you can use. There's only one approved for us, so people can charge a lot for it. David, you probably know how much it costs. Last year, Well, this coming year, for instance, we expect to spend probably 350,000 ram just on treatment chemical. Now, that's one thing about if you're headed for a biorefinery and it will depend on what your input stream is. You want people may look at the bush thinning as just an energy crop and you go through you thin and you don't post treat because then you can come back in a few years and harvest cheaply, you know, because the bush is small, softer. You can go through with machinery and easily with combines like an energy crop harvest and chip at the same time. And if that's an okay in feed for your biorefinery, then you're in good shape and you've saved the cost of post-treatment. Now, you haven't necessarily helped the ecological aspects of the environment because you've got this now super thickened bush on that plot. But if you manage it like a professional forester, you have plots where you do it, plots where you don't in an ecological sense that's okay.

**So these specific use of chemicals, how specific post-care management is that what makes FSC certifications for the farmers most difficult? Or how to say expensive? Or is it just the certification itself? Is it obtaining a certificate itself is expensive or the rules implemented?**

Both are considered expensive by the farmer. The fee for FSC is a problem. They object to that. So they go into these grand schemes with multiple numbers of farmers under one per. They may or may not all behave like they should, but then on top of that, if they're going to post-treat, the fact that they have to use a very expensive chemical is an added problem. But it seems that most people are knuckling under and getting FSC accreditation because in the charcoal industry, they believe it makes a difference.

**These were the questions so far. Thank you so much. Do you have any questions for us?**