


The Blue Economy

A Report to the Club of Rome 2009

A hummingbird with iridescent green and white feathers is shown in profile, hovering towards a small white flower with yellow stamens. The background is a soft-focus green.

**10 years
100 innovations
100 million jobs
inspired by nature**

Prof. Dr. Gunter Pauli

Founder Director of the ZERI Foundation

Member of the Club of Rome

Professor Systems Design at the Faculty of Architecture Politecnico di Torino

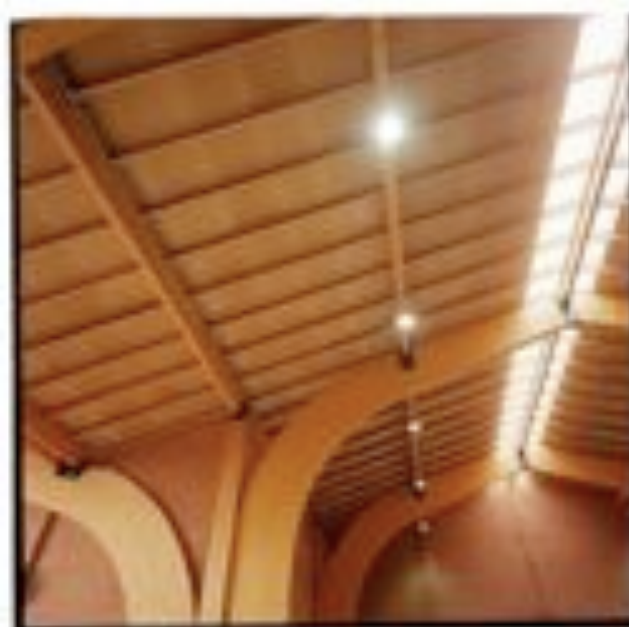
© 2009, Pauli

Singapore

13th of November 2009



1992 - Built the First Ecofactory in Europe



Singapore

13th of November 2009



1992 - Built the First Ecofactory in Europe



Singapore

13th of November 2009



1992 - Built the First Ecofactory in Europe



Singapore

13th of November 2009

Biodegradation is not Sustainability

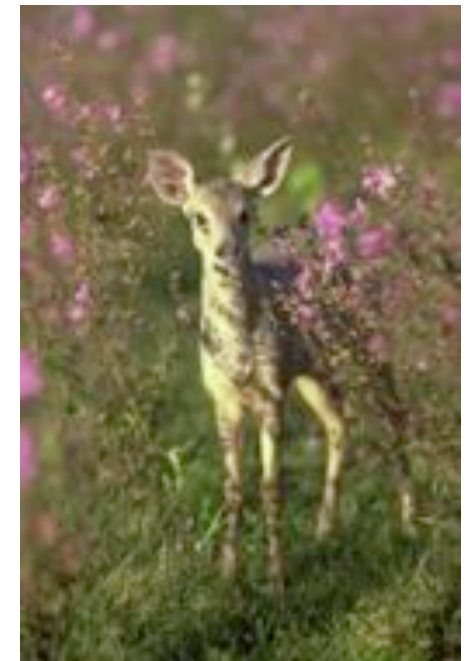
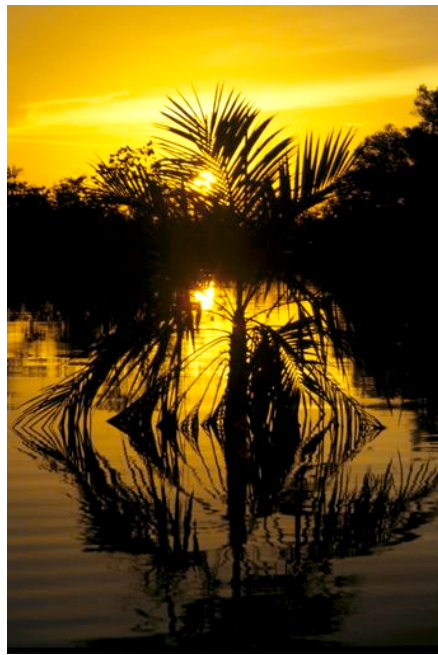


Singapore

13th of November 2009



Design a Competitive Business Model



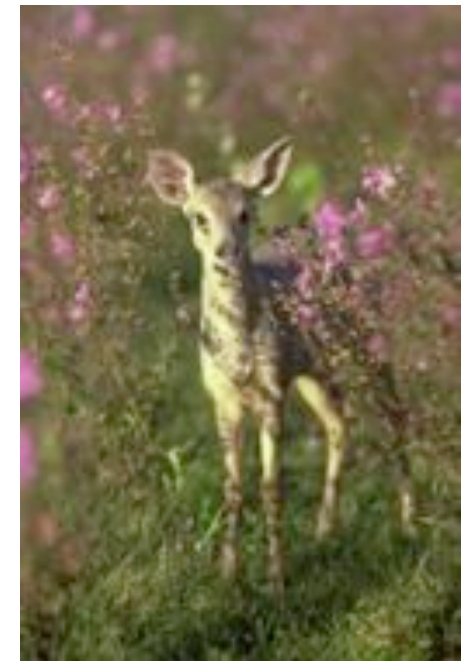
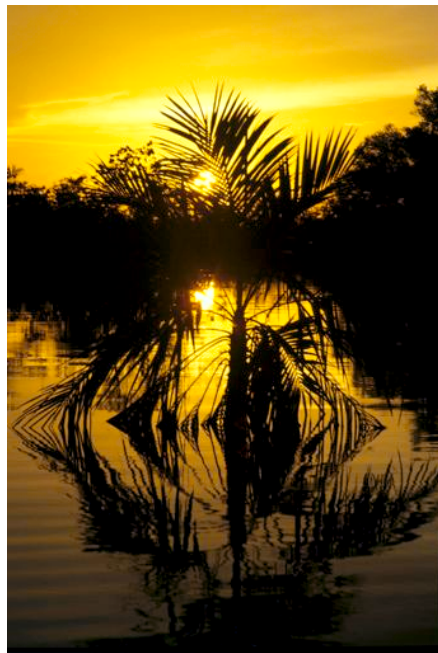
Singapore

13th of November 2009



Design a Competitive Business Model

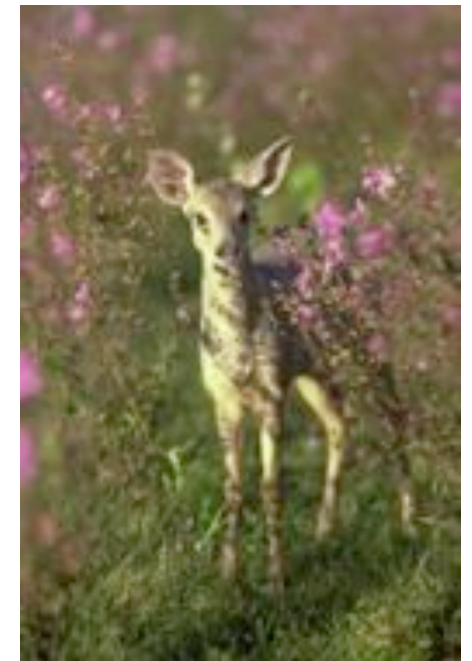
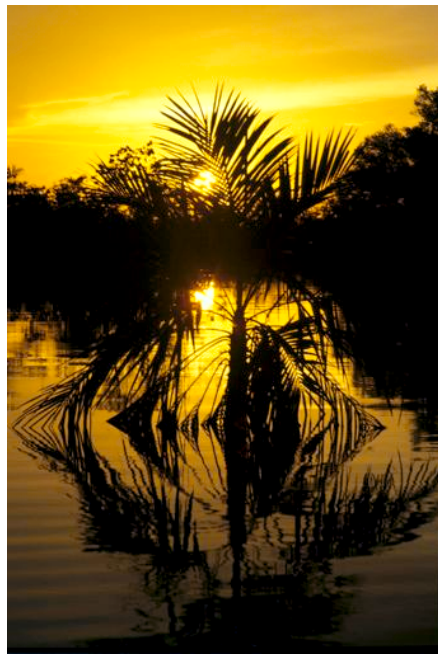
Sustainability is the capacity
to respond to the basic needs of all ...





Design a Competitive Business Model

Sustainability is the capacity
to respond to the basic needs of all ...

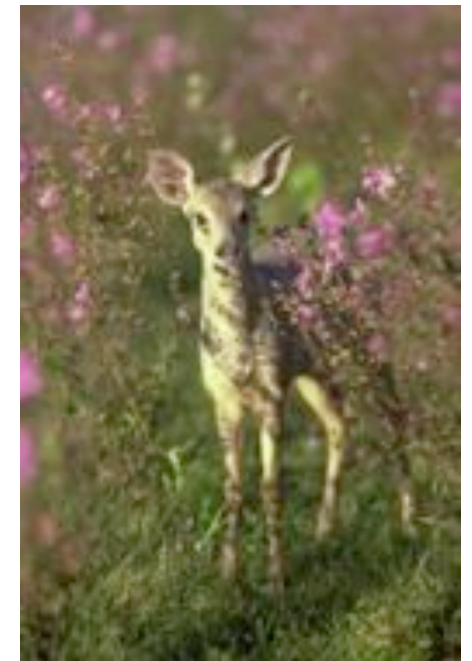
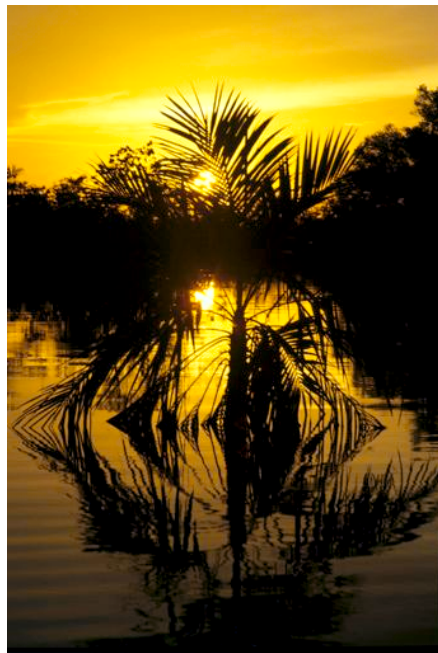


with what we have



Design a Competitive Business Model

Sustainability is the capacity
to respond to the basic needs of all ...



with what we have
(that is how ecosystems work)

The Red Economy





The Red Economy

The Plan
Economy
did not work



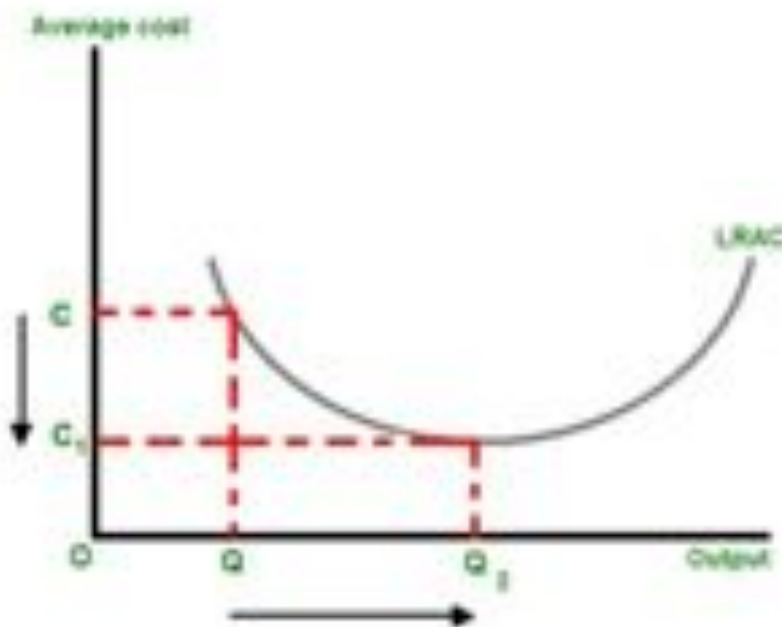


The Red Economy

The **Plan**
Economy
did not work



We cannot
expect to
achieve ever
lower
marginal
cost prices
through
**economies
of scale**





The Red Economy

The **Plan**
Economy
did not work

An Economy
based on
what we **do**
not have



We cannot
expect to
achieve ever
lower
marginal
cost prices
through
economies
of scale



The Red Economy

The Plan
Economy
did not work

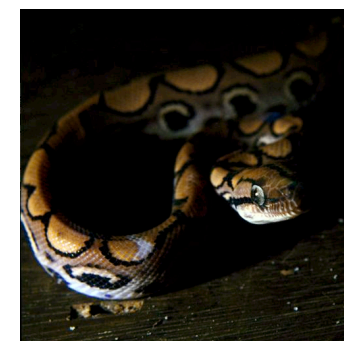
An Economy
based on
what we do
not have



We cannot
expect to
have ever
lower
marginal
cost prices
through
economies
of scale



The Green Economy

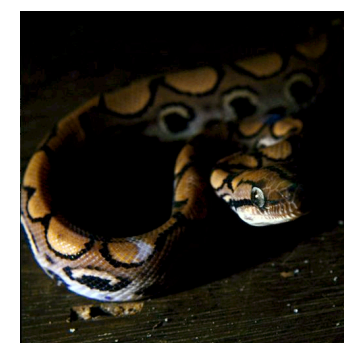


Singapore

13th of November 2009



The Green Economy

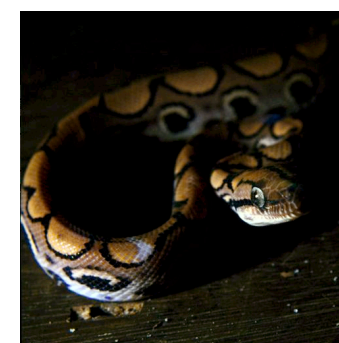


Singapore

13th of November 2009



The Green Economy

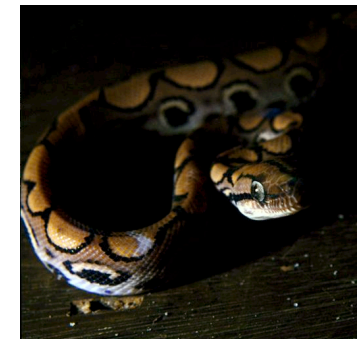


Requires to
Invest more
Save some
Payback over time





The Green Economy



Requires to
Invest more
Save some
Payback over time

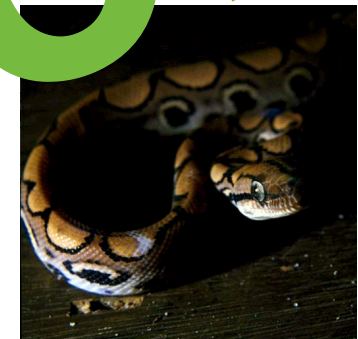


only works for the rich





The Green Economy



Requires to
Invest more
Save some
Payback over time

only works for the rich

The Blue Economy



The Blue Economy

A high-resolution satellite image of the Earth from space, showing the Western Hemisphere. The Americas are visible in the center, surrounded by the blue oceans and white cloud patterns. The image is used as a background for the central text.

**Invest less
innovate more
generate multiple cash flow
create jobs
build up social capital
stimulate entrepreneurship**



Singapore

13th of November 2009



How to stimulate entrepreneurship to create competitive and sustainable society at times of crisis?



How to stimulate entrepreneurship to create competitive and sustainable society at times of crisis?

FIRST Think Positive



How to stimulate entrepreneurship to create competitive and sustainable society at times of crisis?

FIRST Think Positive

SECOND Creative Learning



How to stimulate entrepreneurship to create competitive and sustainable society at times of crisis?

FIRST Think Positive

SECOND Creative Learning

THIRD Make it Happen



How to stimulate entrepreneurship to create competitive and sustainable society at times of crisis?

FIRST Think Positive

SECOND Creative Learning

THIRD Make it Happen

This requires innovations in the business model



Converting CO₂ into Cash Flow



Converting CO₂ into Cash Flow



“Food Security and Climate”



Convert
flue gas/ CO_2 into
probiotic food and
biodiesel
and jobs



Jorge Alberto Vieira Costa
UFRG



Singapore

13th of November 2009

children evolve from
malnourished
to healthy





Thanks to coal fire power stations
The economy shifts from scarcity to abundance

children evolve from
malnourished
to healthy



Singapore

13th of November 2009



Thanks to coal fire power stations
The economy shifts from scarcity to abundance

children evolve from
malnourished
to healthy

Then excess of
spirulina converted
to biofuels





Thanks to coal fire power stations
The economy shifts from scarcity to abundance

children evolve from
malnourished
to healthy

Then excess of
spirulina converted
to biofuels

The left-overs
into esters
and polyesters





Thanks to coal fire power stations
The economy shifts from scarcity to abundance

children evolve from
malnourished
to healthy

Then excess of
spirulina converted
to biofuels

The left-overs
into esters
and polyesters

35 Masters and
7 doctorates



Production of Polymers



“Evolving like an Ecosystem”



Natural systems produce polymers



Natural systems produce polymers

Amino Acids

Converted to silk by ants, bees, moths and spiders





Natural systems produce polymers

Amino Acids

Converted to silk by ants, bees, moths and spiders



NOT from petroleum or corn starch



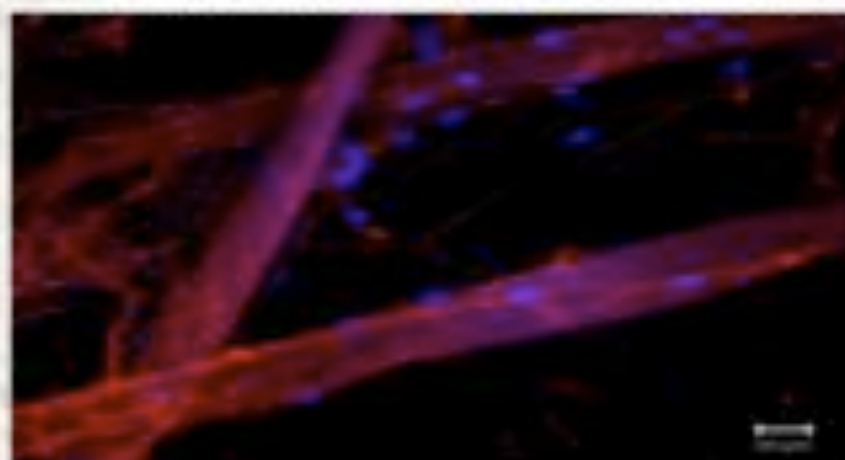
Silk can outcompete Titanium in price and performance



Silk can outcompete Titanium in price and performance



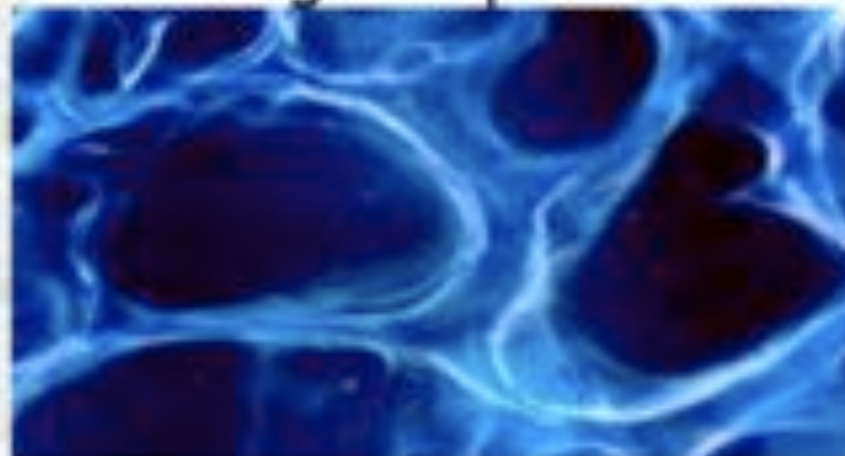
- Nerve Repair Conduit



- Suture Thread



- Cartilage Repair Device



- Bone Graft Material





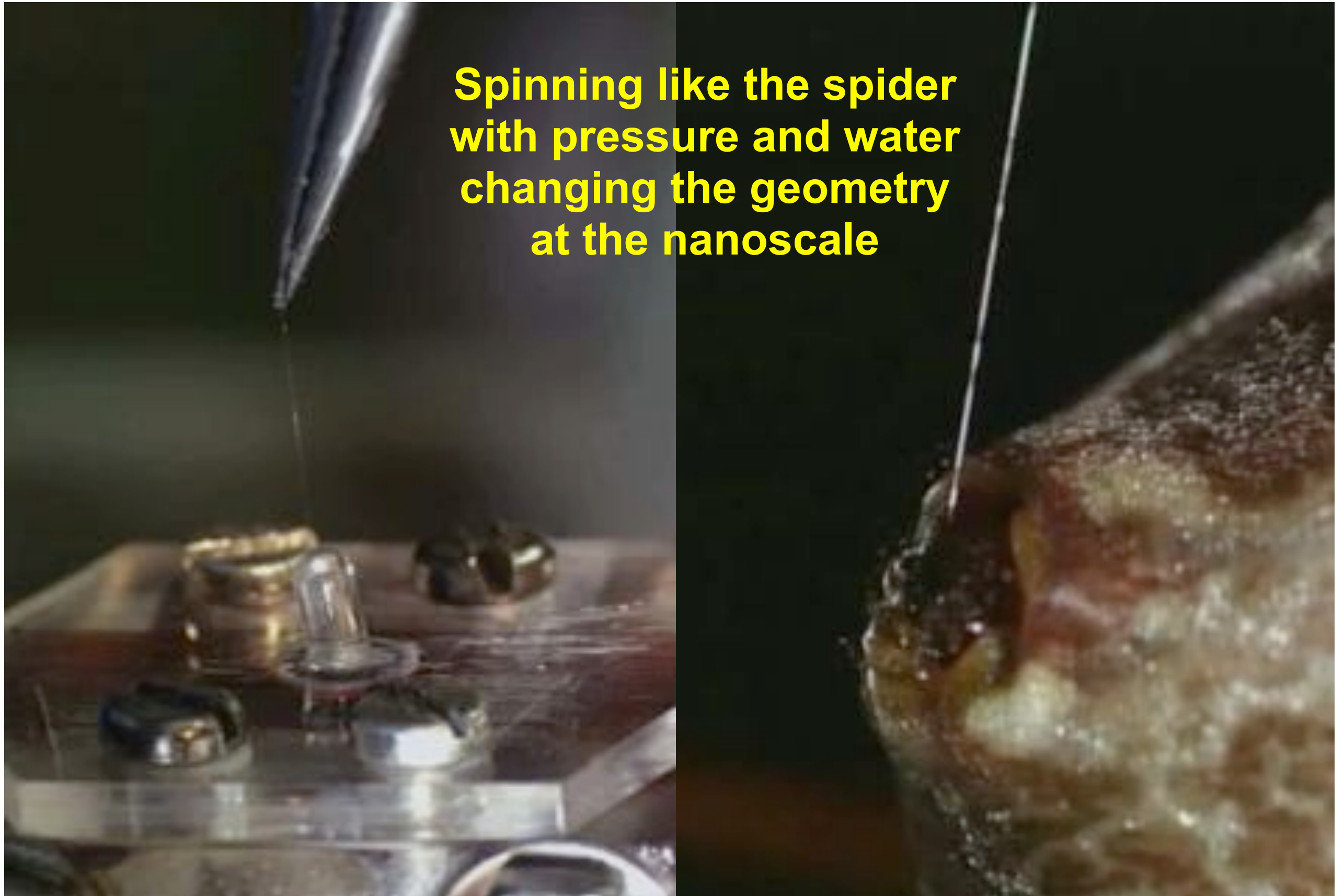
Silk geometry is the basis for product development



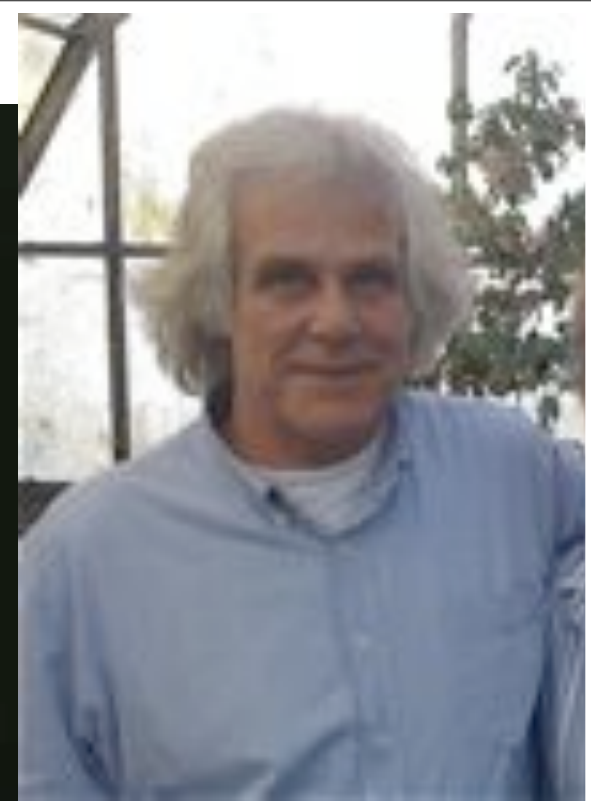
Singapore

13th of November 2009

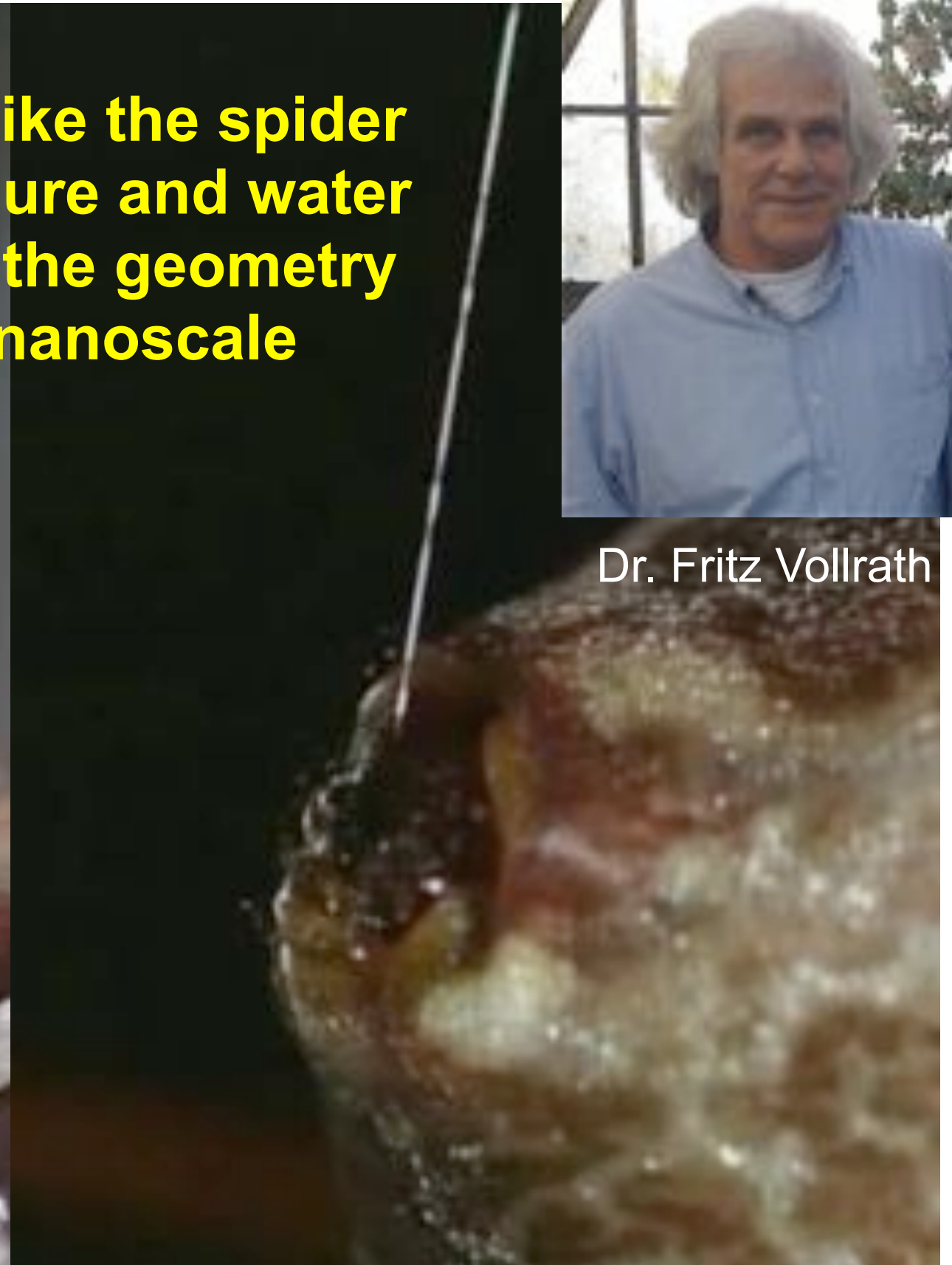
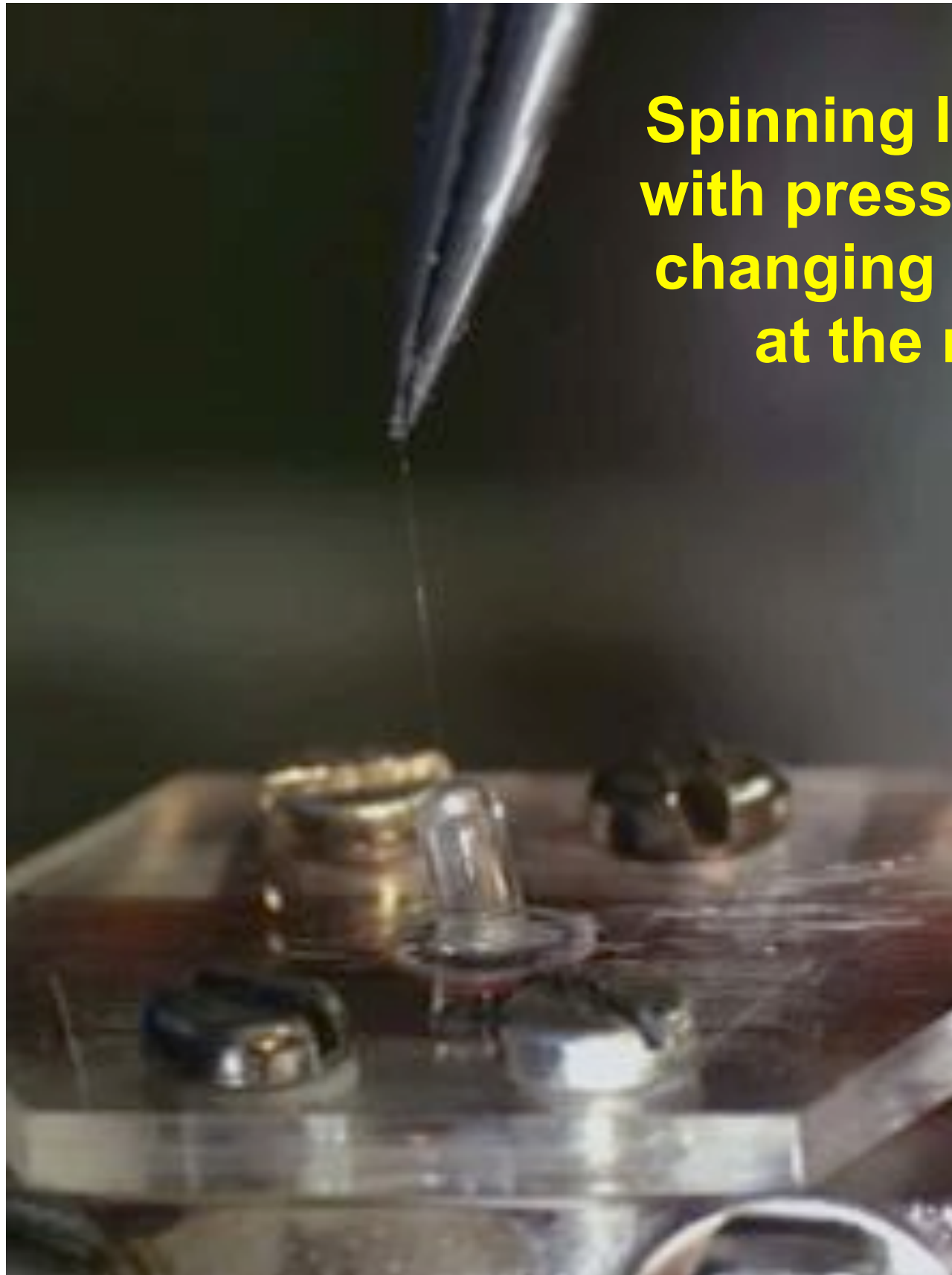
**Spinning like the spider
with pressure and water
changing the geometry
at the nanoscale**



**Spinning like the spider
with pressure and water
changing the geometry
at the nanoscale**



Dr. Fritz Vollrath





Singapore

13th of November 2009





Replace stainless steel and titanium
with silk at half the cost per pound
managing the geometry at the nanoscale
prototype project



NO metals NO petroleum NO landfill



Replace stainless steel and titanium
with silk at half the cost per pound
managing the geometry at the nanoscale
prototype project



The real value of the silk worm





The real value of the silk worm



1 ton raw silk per year 1/3 is carbon fixed

9 tons of fertilizer recovering top soil

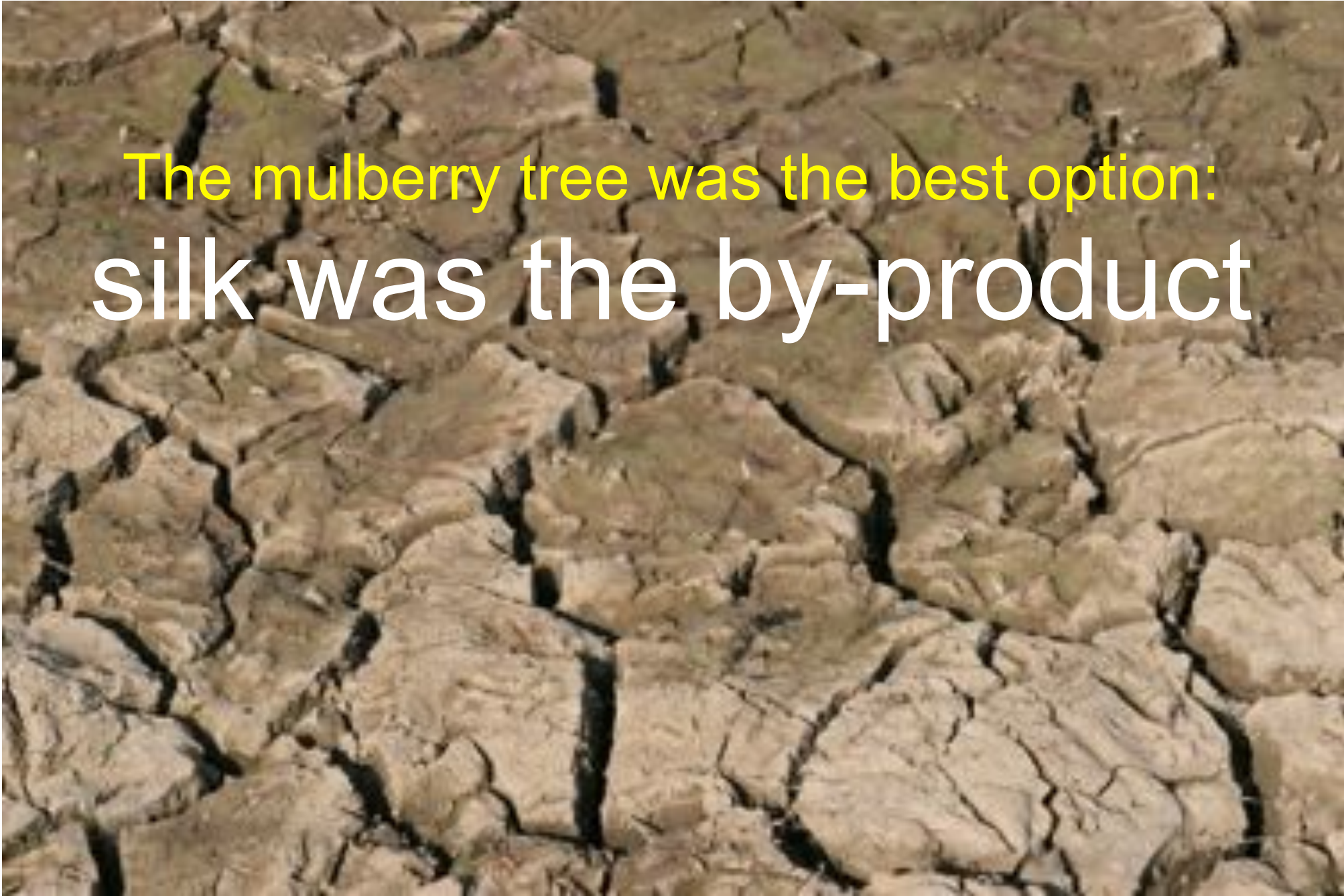


The Chinese pioneered ways to regenerate top soil 5,000 years ago





The Chinese pioneered ways
to regenerate top soil 5,000 years ago

A close-up photograph of dry, cracked earth, showing a network of deep, irregular fissures in the brown soil.

The mulberry tree was the best option:
silk was the by-product



Now we can combine
natural silk polymers

with the regeneration of top soil
creating millions of jobs





Now we can combine
natural silk polymers

with the regeneration of top soil
creating millions of jobs

insert maggot enzymes
into silk for slow delivery
of wound care





100,000 tons of silk



Singapore

13th of November 2009



100,000 tons of silk

250,000 HA



Singapore

13th of November 2009



100,000 tons of silk



250,000 HA

3,000 abattoirs



100,000 tons of silk



250,000 HA

3,000 abattoirs

2,000,000 jobs

The Awakening Power of Coffee



“Cascading all Nutrients and Energy”



Natural systems never send
organic waste to landfills or incinerators



Natural systems never send
organic waste to landfills or incinerators

Waste of one is food for another
belonging to another kingdom



Natural systems never send
organic waste to landfills or incinerators

Waste of one is food for another
belonging to another kingdom
(mad cow disease)



Is there a crisis in the coffee market?

123.6 million bags of 60 kg



Is there a crisis in the coffee market?

123.6 million bags of 60 kg





Is there a crisis in the coffee market?

123.6 million bags of 60 kg

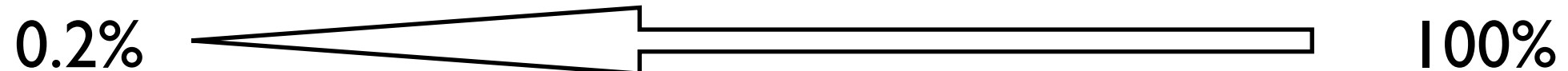


100%



Is there a crisis in the coffee market?

123.6 million bags of 60 kg





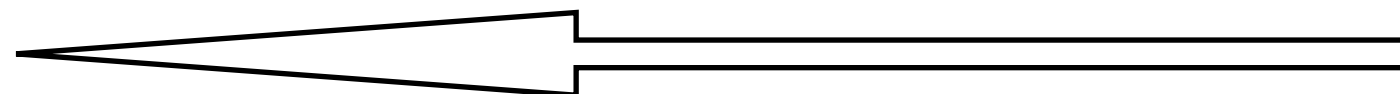
only 0.2% has value

Is there a crisis in the coffee market?

123.6 million bags of 60 kg



0.2%



100%



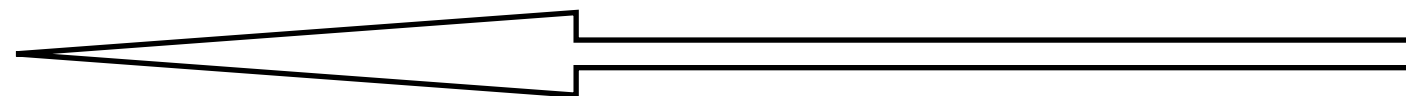
only 0.2% has value

Is there a crisis in the coffee market?

123.6 million bags of 60 kg



0.2%



100%



Singapore

13th of November 2009



producing shiitake at one tenth of the cost

Singapore

13th of November 2009



Women pioneers converting pulp to protein



Chido Govero

Zimbabwe



Ivanka Milenkovic

Serbia



Carmenza Jaramillo

Colombia

Singapore

13th of November 2009



Shifting the Business Model from Production to Consumption



Coffee processing in Chipinge, Zimbabwe

Singapore

13th of November 2009



Women empowerment in Chipinge, Zimbabwe

Singapore

13th of November 2009



Women empowerment in Chipinge, Zimbabwe

Singapore

13th of November 2009



Chido's Blend™

Zimbabwe, Rwanda and Kenya —
A blend of spice, wood, floral and fruit notes

NET WT. 12 OZ. (341 G.) ROASTED DATE: OCT 28 2008

WWW.EQUATORCOFFEES.COM 1-800-809-7687

Chido's Blend™ Supports One Woman's Hope for the Future

Chido's Blend supports the work of the ZERI Foundation and its “pulp to protein” program in Africa, which turns coffee production waste into high-quality food. Led by Chido Govero, a dynamic young woman from Zimbabwe, this ingenious program supports self-sufficiency by using coffee pulp and other wastes as a growing medium for nutritious edible mushrooms, and the spent mushroom compost as feed for goats and other animals. **Chido and ZERI recently won the “Sustainability Award” at the Specialty Coffee conference.**

www.zeri.org

You can make a difference.
Tell your friends about the great work Chido and the ZERI Foundation are doing to empower girls at risk in Africa, and how they can support her efforts with an order of Chido's Blend.


EQUATOR ESTATE COFFEES & TEAS®
115 JORDAN STREET
SAN RAFAEL, CA 94901
(800) 809-7687
WWW.EQUATORCOFFEES.COM

Singapore

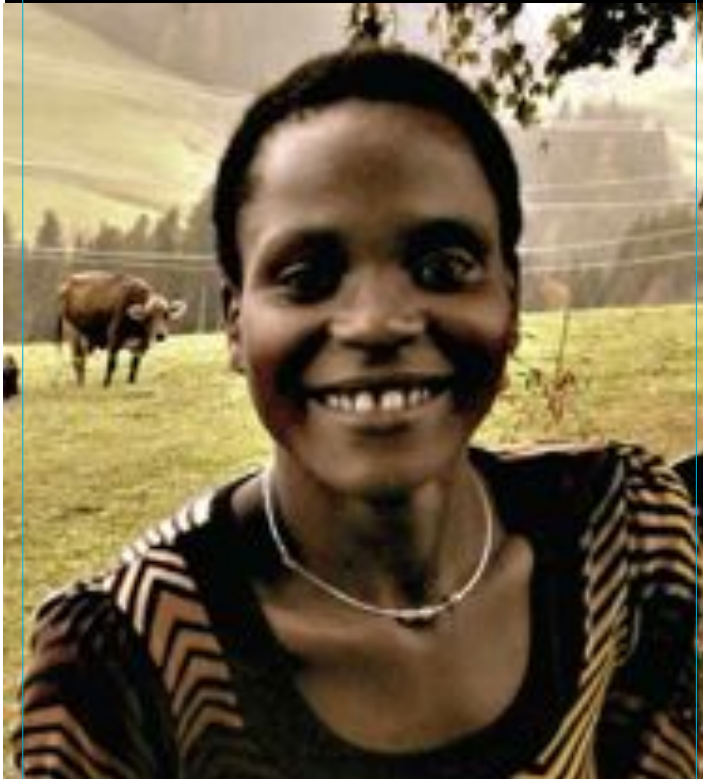
13th of November 2009



Relaunch Export from Zimbabwe




Chido's Blend™



Zimbabwe, Rwanda and Kenya —
A blend of spice, wood, floral and fruit notes


NET WT. 12 OZ. (341 G.) ROASTED DATE: OCT 28 2008

WWW.EQUATORCOFFEES.COM 1-800-809-7687



Chido's Blend™ Supports One Woman's Hope for the Future

Chido's Blend supports the work of the ZERI Foundation and its "pulp to protein" program in Africa, which turns coffee production waste into high-quality food. Led by Chido Govero, a dynamic young woman from Zimbabwe, this ingenious program supports self-sufficiency by using coffee pulp and other wastes as a growing medium for nutritious edible mushrooms, and the spent mushroom compost as feed for goats and other animals. **Chido and ZERI recently won the "Sustainability Award" at the Specialty Coffee conference.**



www.zeri.org

You can make a difference.
Tell your friends about the great work Chido and the ZERI Foundation are doing to empower girls at risk in Africa, and how they can support her efforts with an order of Chido's Blend.

EQUATOR ESTATE COFFEES & TEAS®
115 JORDAN STREET
SAN RAFAEL, CA 94901
(800) 809-7687
WWW.EQUATORCOFFEES.COM

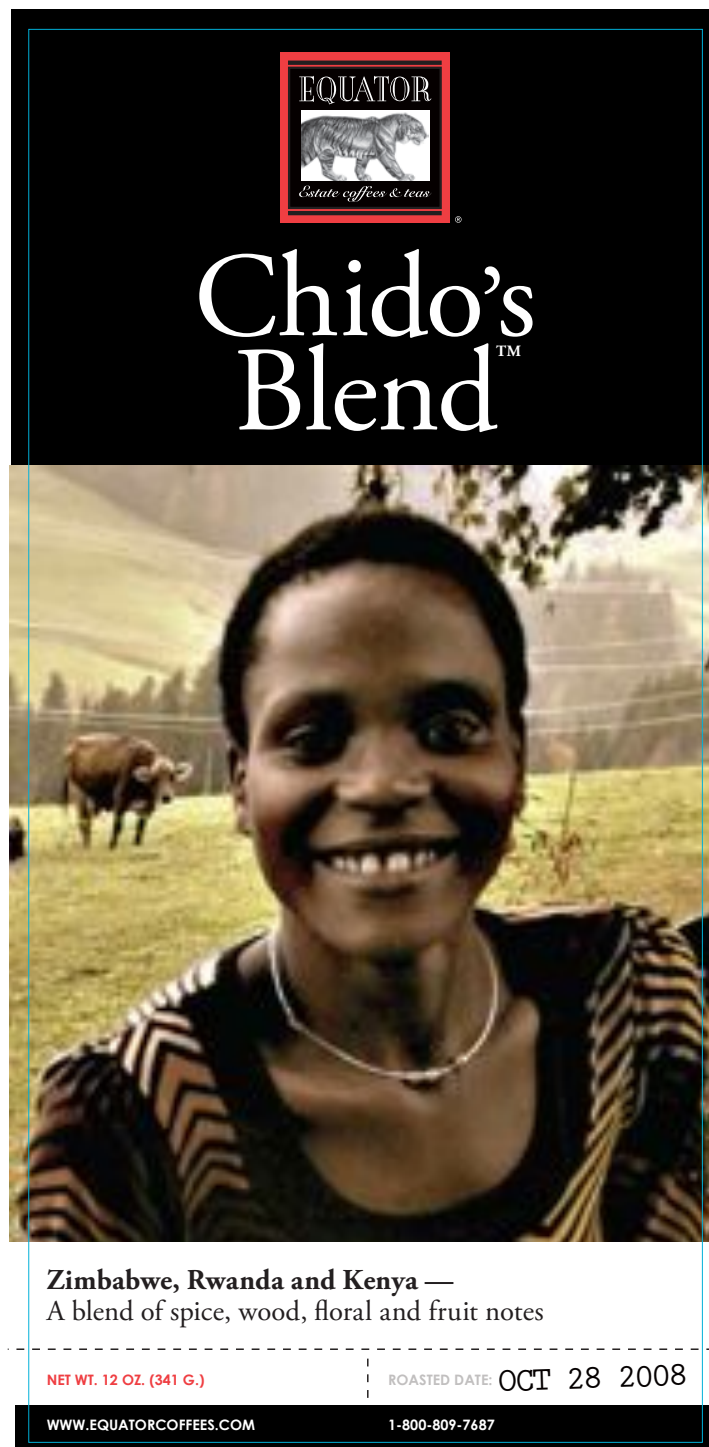
Singapore

13th of November 2009



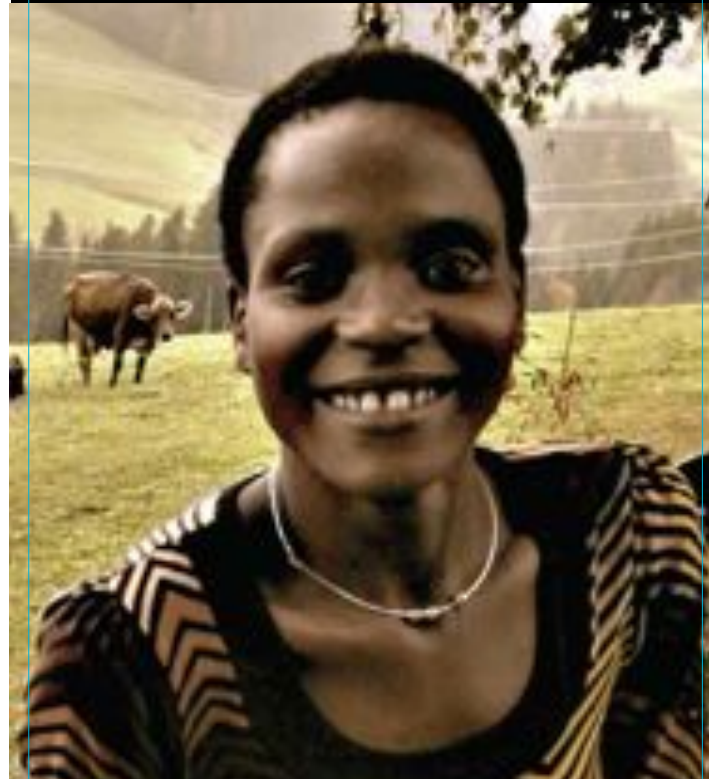
Relaunch
Export from
Zimbabwe

Cash crop
Basis for
Food
Security



EQUATOR
Estate coffees & teas

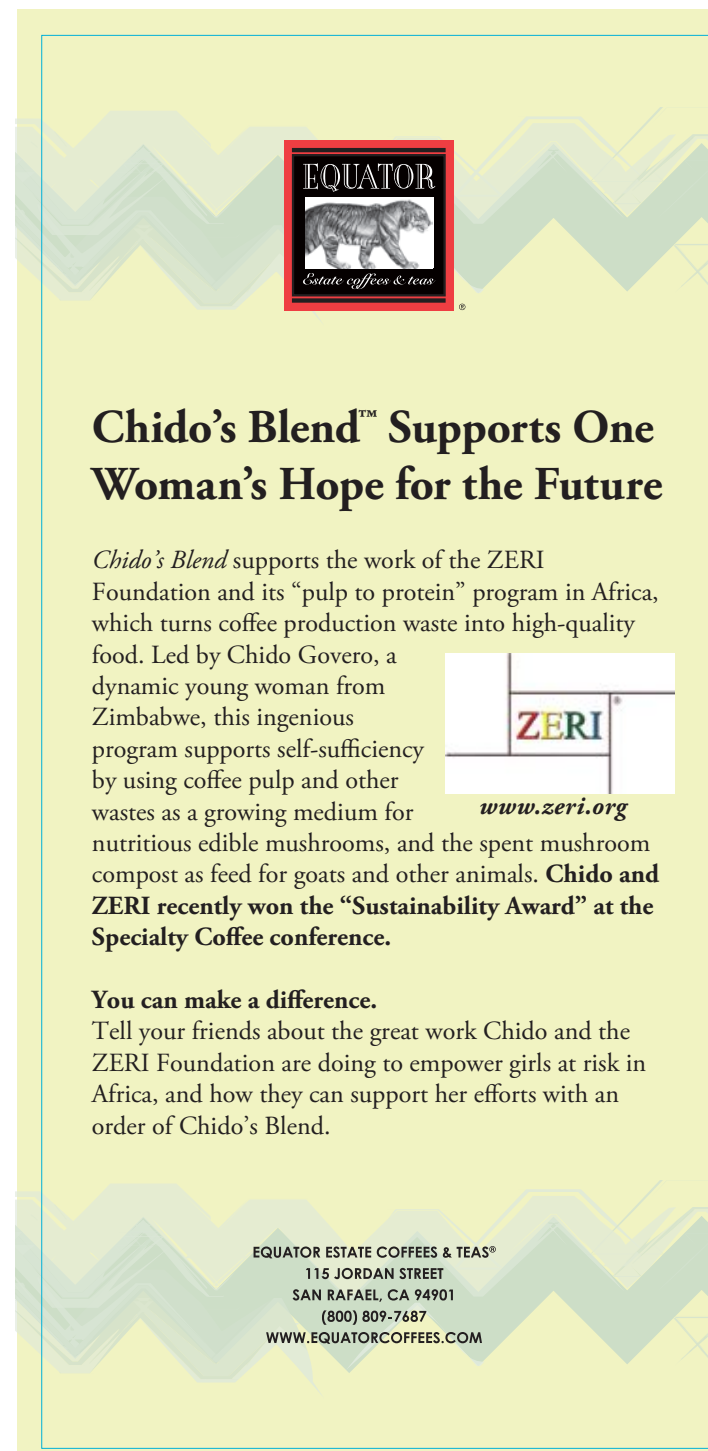
Chido's Blend™



Zimbabwe, Rwanda and Kenya —
A blend of spice, wood, floral and fruit notes

NET WT. 12 OZ. (341 G.) ROASTED DATE: OCT 28 2008


WWW.EQUATORCOFFEES.COM 1-800-809-7687



EQUATOR
Estate coffees & teas

Chido's Blend™ Supports One Woman's Hope for the Future

Chido's Blend supports the work of the ZERI Foundation and its "pulp to protein" program in Africa, which turns coffee production waste into high-quality food. Led by Chido Govero, a dynamic young woman from Zimbabwe, this ingenious program supports self-sufficiency by using coffee pulp and other wastes as a growing medium for nutritious edible mushrooms, and the spent mushroom compost as feed for goats and other animals. **Chido and ZERI recently won the "Sustainability Award" at the Specialty Coffee conference.**



www.zeri.org

You can make a difference.
Tell your friends about the great work Chido and the ZERI Foundation are doing to empower girls at risk in Africa, and how they can support her efforts with an order of Chido's Blend.

EQUATOR ESTATE COFFEES & TEAS®
115 JORDAN STREET
SAN RAFAEL, CA 94901
(800) 809-7687
WWW.EQUATORCOFFEES.COM

Singapore

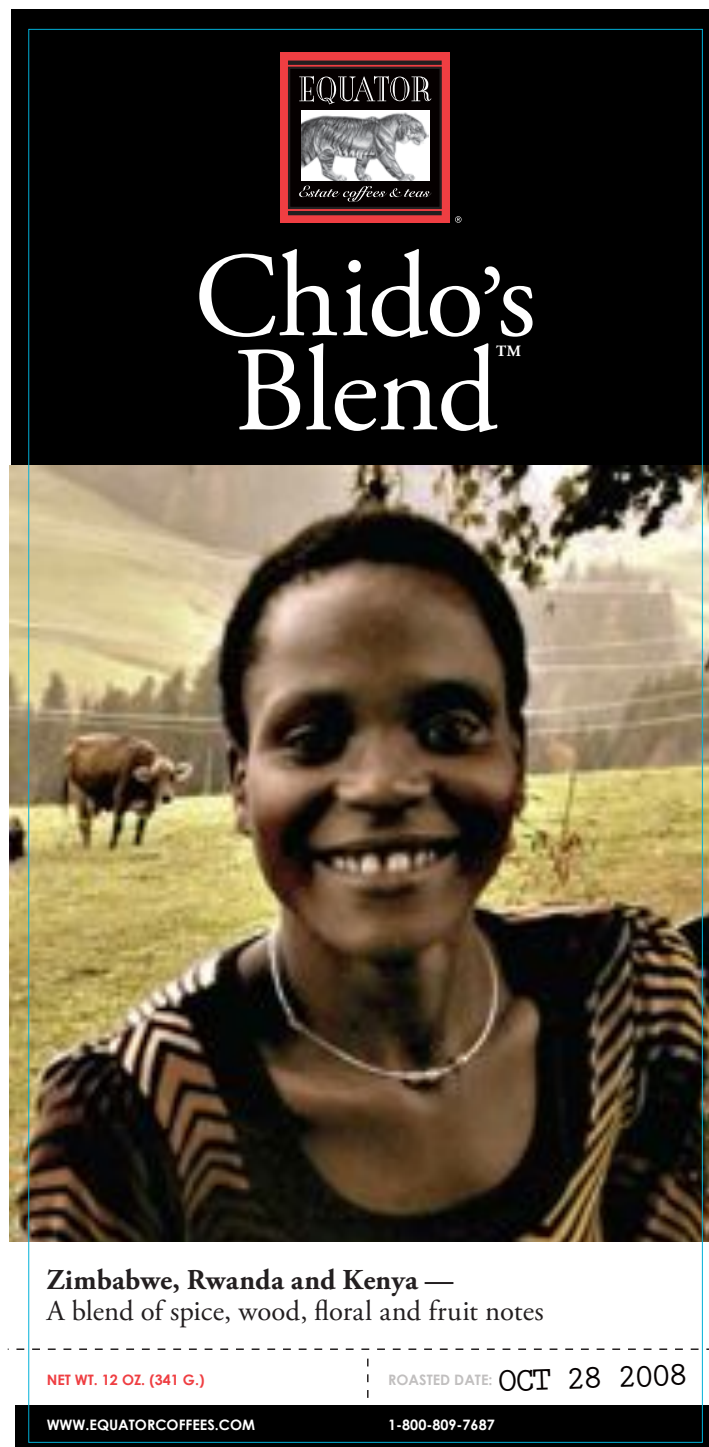
13th of November 2009



Relaunch
Export from
Zimbabwe

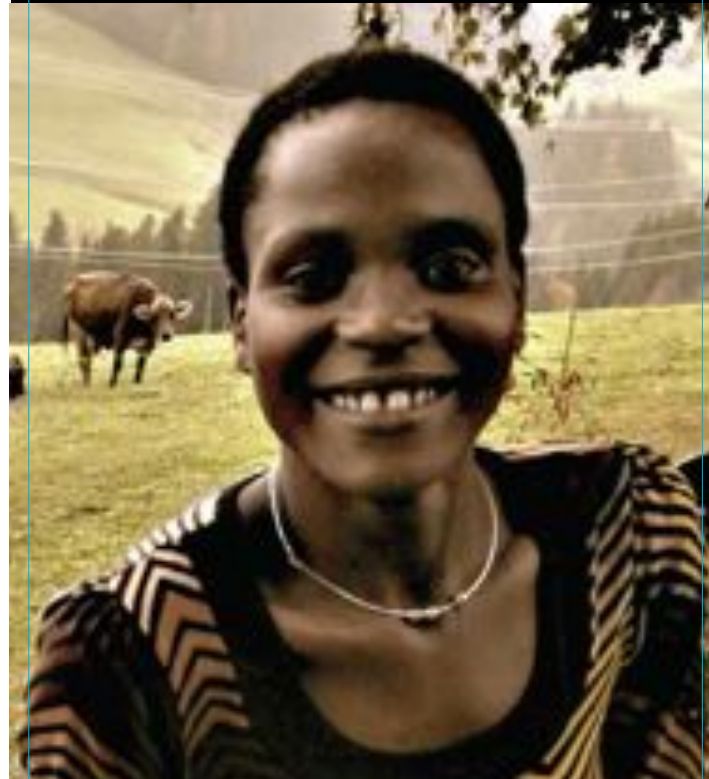
Cash crop
Basis for
Food
Security

Food
Security
eliminates
abuse



EQUATOR
Estate coffees & teas

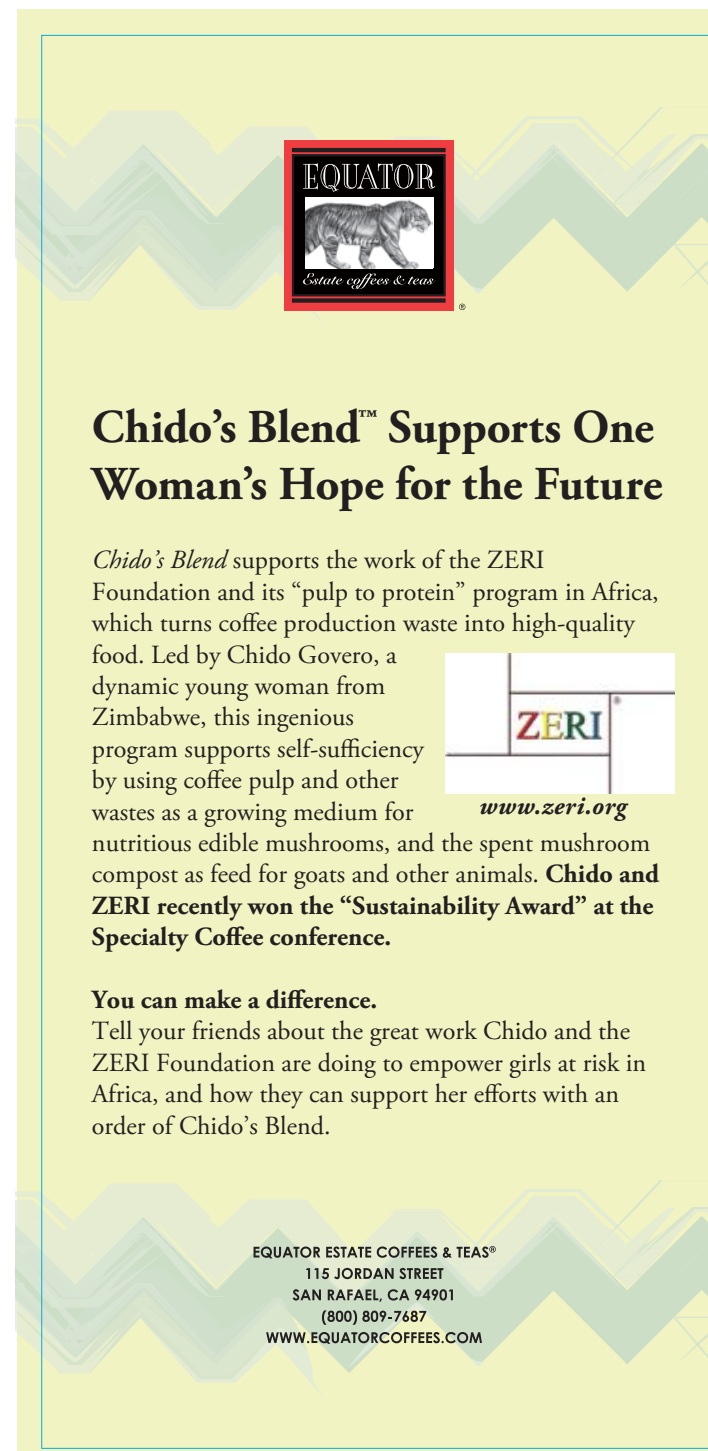
Chido's Blend™



Zimbabwe, Rwanda and Kenya —
A blend of spice, wood, floral and fruit notes

NET WT. 12 OZ. (341 G.) ROASTED DATE: OCT 28 2008

WWW.EQUATORCOFFEES.COM 1-800-809-7687




EQUATOR
Estate coffees & teas

Chido's Blend™ Supports One Woman's Hope for the Future

Chido's Blend supports the work of the ZERI Foundation and its "pulp to protein" program in Africa, which turns coffee production waste into high-quality food. Led by Chido Govero, a dynamic young woman from Zimbabwe, this ingenious program supports self-sufficiency by using coffee pulp and other wastes as a growing medium for nutritious edible mushrooms, and the spent mushroom compost as feed for goats and other animals. **Chido and ZERI recently won the "Sustainability Award" at the Specialty Coffee conference.**

You can make a difference.
Tell your friends about the great work Chido and the ZERI Foundation are doing to empower girls at risk in Africa, and how they can support her efforts with an order of Chido's Blend.


www.zeri.org

EQUATOR ESTATE COFFEES & TEAS®
115 JORDAN STREET
SAN RAFAEL, CA 94901
(800) 809-7687
WWW.EQUATORCOFFEES.COM

Singapore

13th of November 2009

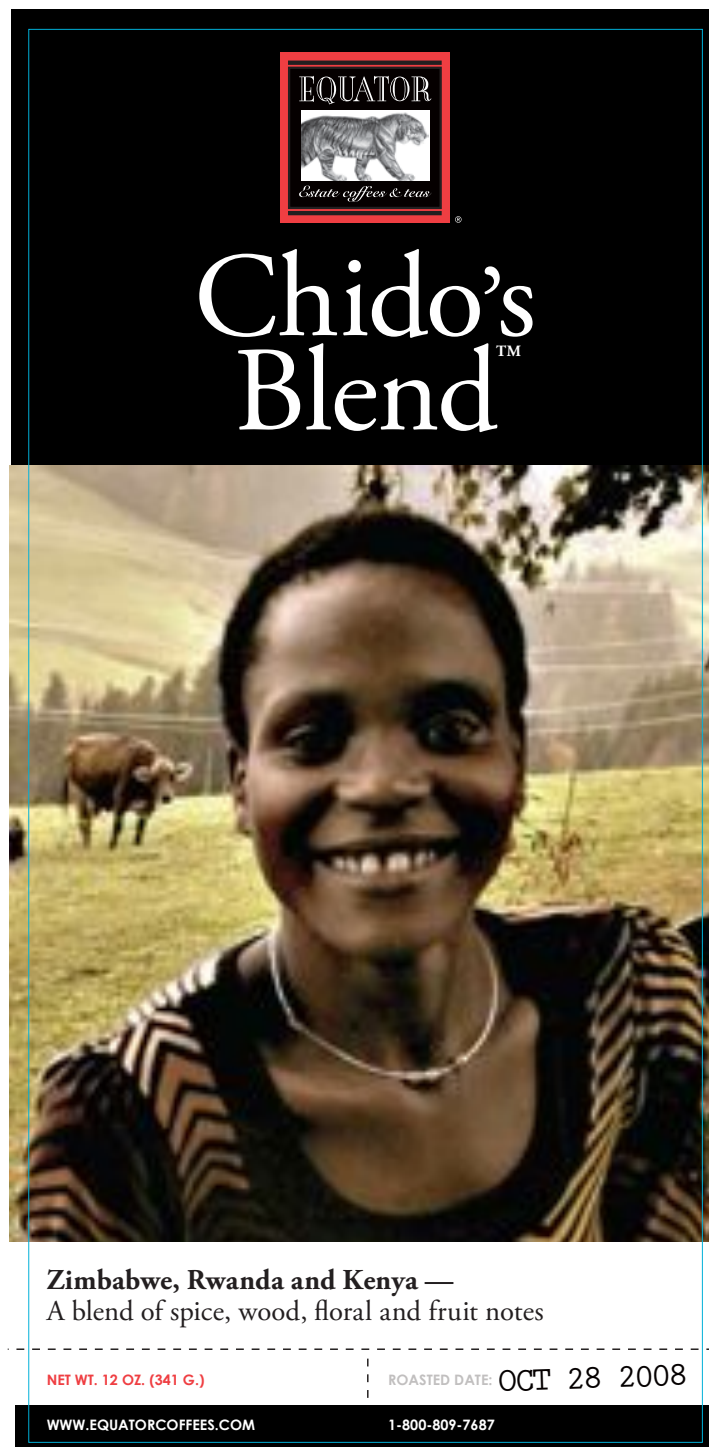


Relaunch
Export from
Zimbabwe

Cash crop
Basis for
Food
Security

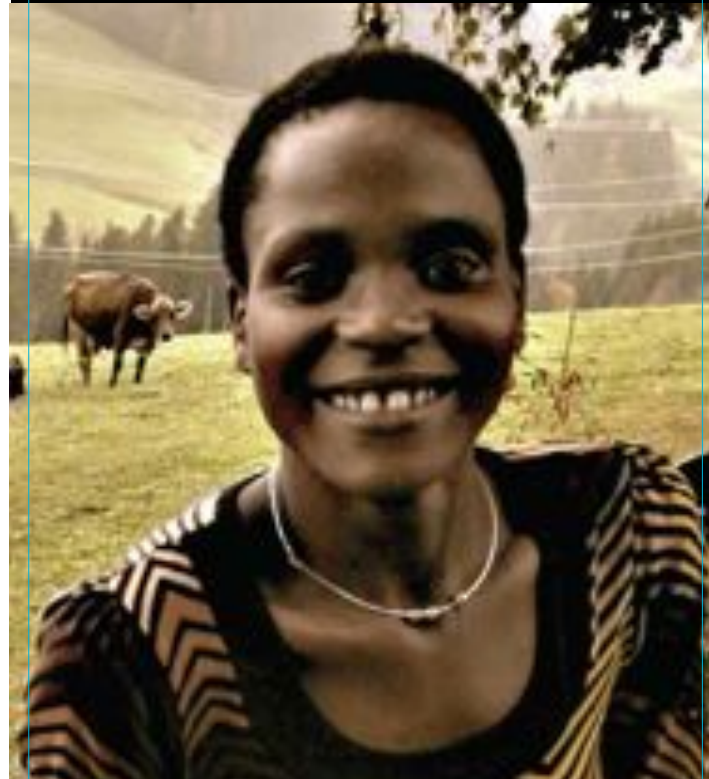
Food
Security
eliminates
abuse

Save girls
from
sex trade



EQUATOR
Estate coffees & teas

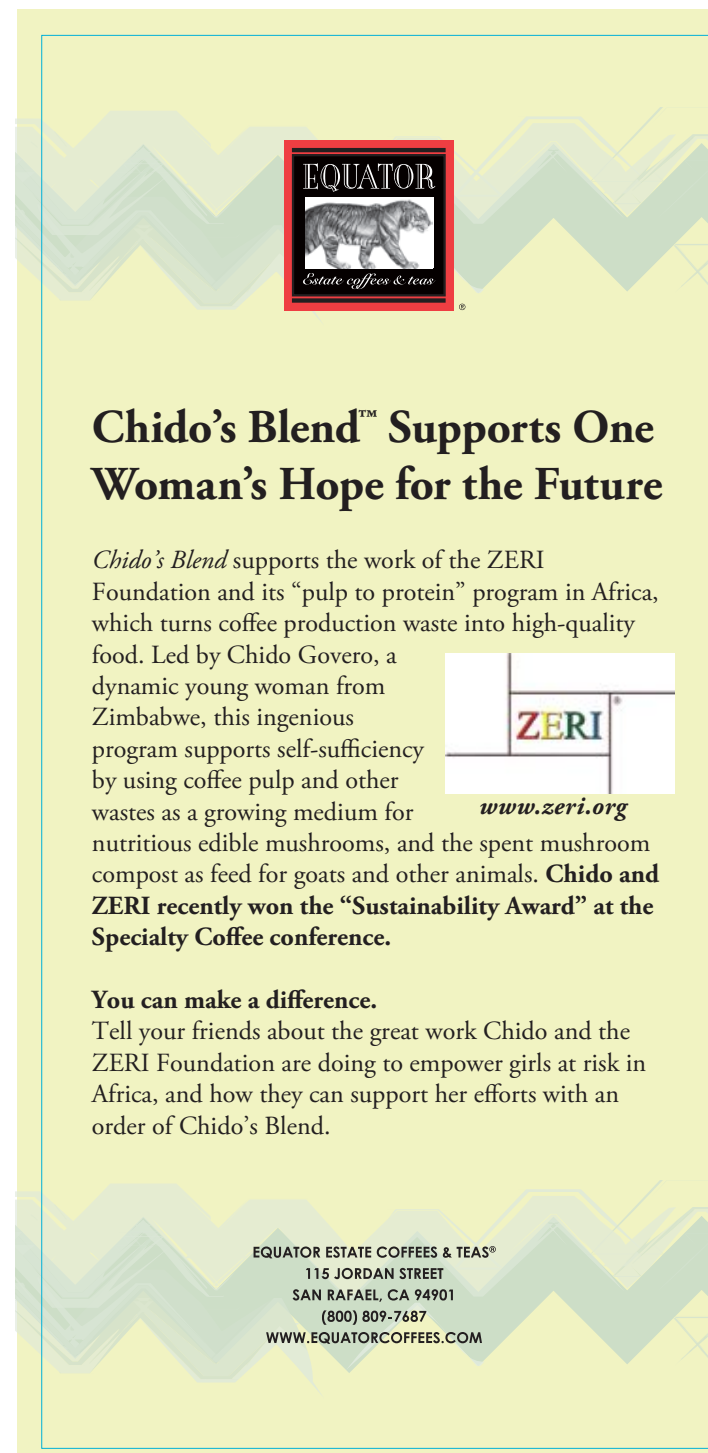
Chido's Blend™



Zimbabwe, Rwanda and Kenya —
A blend of spice, wood, floral and fruit notes

NET WT. 12 OZ. (341 G.) ROASTED DATE: OCT 28 2008

WWW.EQUATORCOFFEES.COM 1-800-809-7687




EQUATOR
Estate coffees & teas

Chido's Blend™ Supports One Woman's Hope for the Future

Chido's Blend supports the work of the ZERI Foundation and its "pulp to protein" program in Africa, which turns coffee production waste into high-quality food. Led by Chido Govero, a dynamic young woman from Zimbabwe, this ingenious program supports self-sufficiency by using coffee pulp and other wastes as a growing medium for nutritious edible mushrooms, and the spent mushroom compost as feed for goats and other animals. **Chido and ZERI recently won the "Sustainability Award" at the Specialty Coffee conference.**

You can make a difference.
Tell your friends about the great work Chido and the ZERI Foundation are doing to empower girls at risk in Africa, and how they can support her efforts with an order of Chido's Blend.


www.zeri.org

EQUATOR ESTATE COFFEES & TEAS®
115 JORDAN STREET
SAN RAFAEL, CA 94901
(800) 809-7687
WWW.EQUATORCOFFEES.COM

Singapore

13th of November 2009



Relaunch
Export from
Zimbabwe

Cash crop
Basis for
Food
Security

Food
Security
eliminates
abuse

Save girls
from
sex trade

EQUATOR
Estate coffees & teas

Chido's Blend™

Zimbabwe, Rwanda and Kenya —
A blend of spice, wood, floral and fruit notes

NET WT. 12 OZ. (341 G.) ROASTED DATE: OCT 28 2008

WWW.EQUATORCOFFEES.COM 1-800-809-7687

EQUATOR
Estate coffees & teas

Chido's Blend™ Supports One Woman's Hope for the Future

Chido's Blend supports the work of the ZERI Foundation and its "pulp to protein" program in Africa, which turns coffee production waste into high-quality food. Led by Chido Govero, a dynamic young woman from Zimbabwe, this ingenious program supports self-sufficiency by using coffee pulp and other wastes as a growing medium for nutritious edible mushrooms, and the spent mushroom compost as feed for goats and other animals. **Chido and ZERI recently won the "Sustainability Award" at the Specialty Coffee conference.**

You can make a difference.
Tell your friends about the great work Chido and the ZERI Foundation are doing to empower girls at risk in Africa, and how they can support her efforts with an order of Chido's Blend.

EQUATOR ESTATE COFFEES & TEAS®
115 JORDAN STREET
SAN RAFAEL, CA 94901
(800) 809-7687
WWW.EQUATORCOFFEES.COM

That is the
real power
of your
purchasing
power

Singapore

13th of November 2009



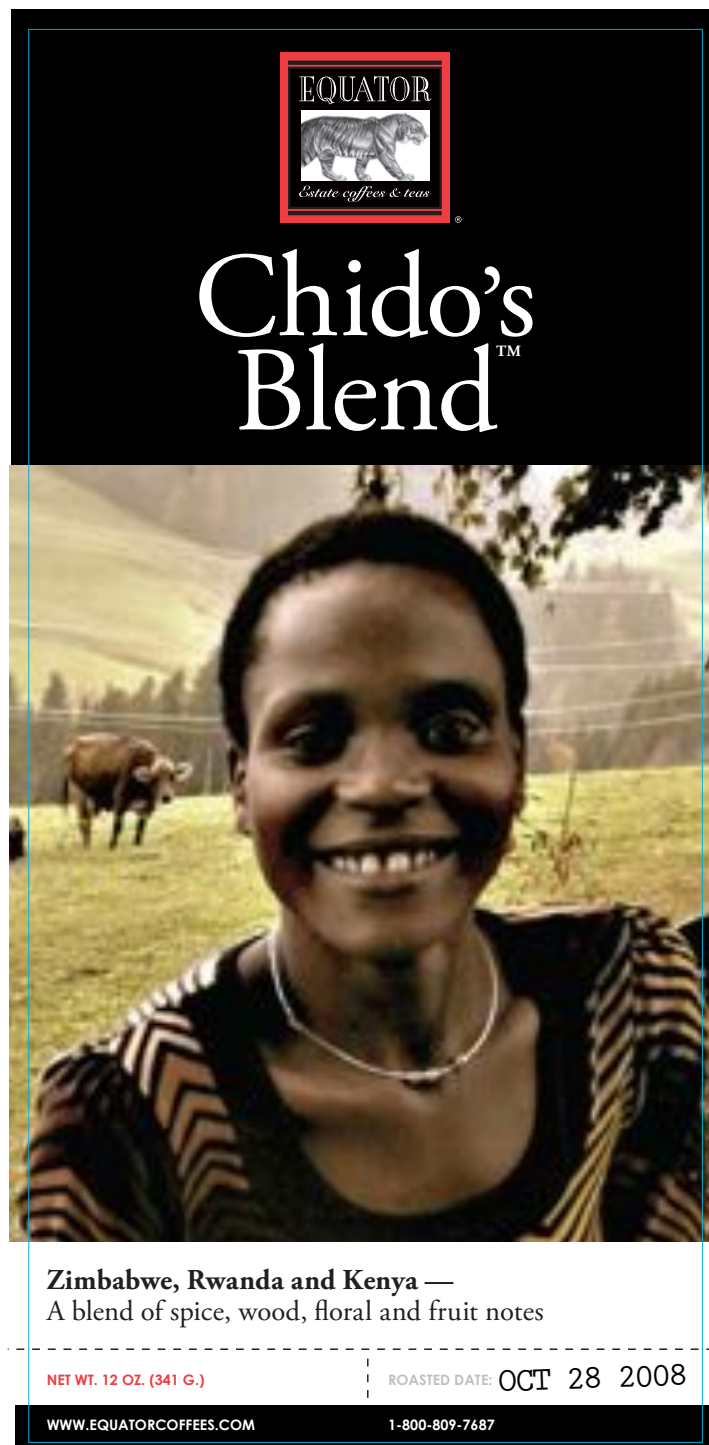
NO waste **NO** hunger **NO** abuse **NO** sex trade

Relaunch
Export from
Zimbabwe

Cash crop
Basis for
Food
Security

Food
Security
eliminates
abuse

Save girls
from
sex trade



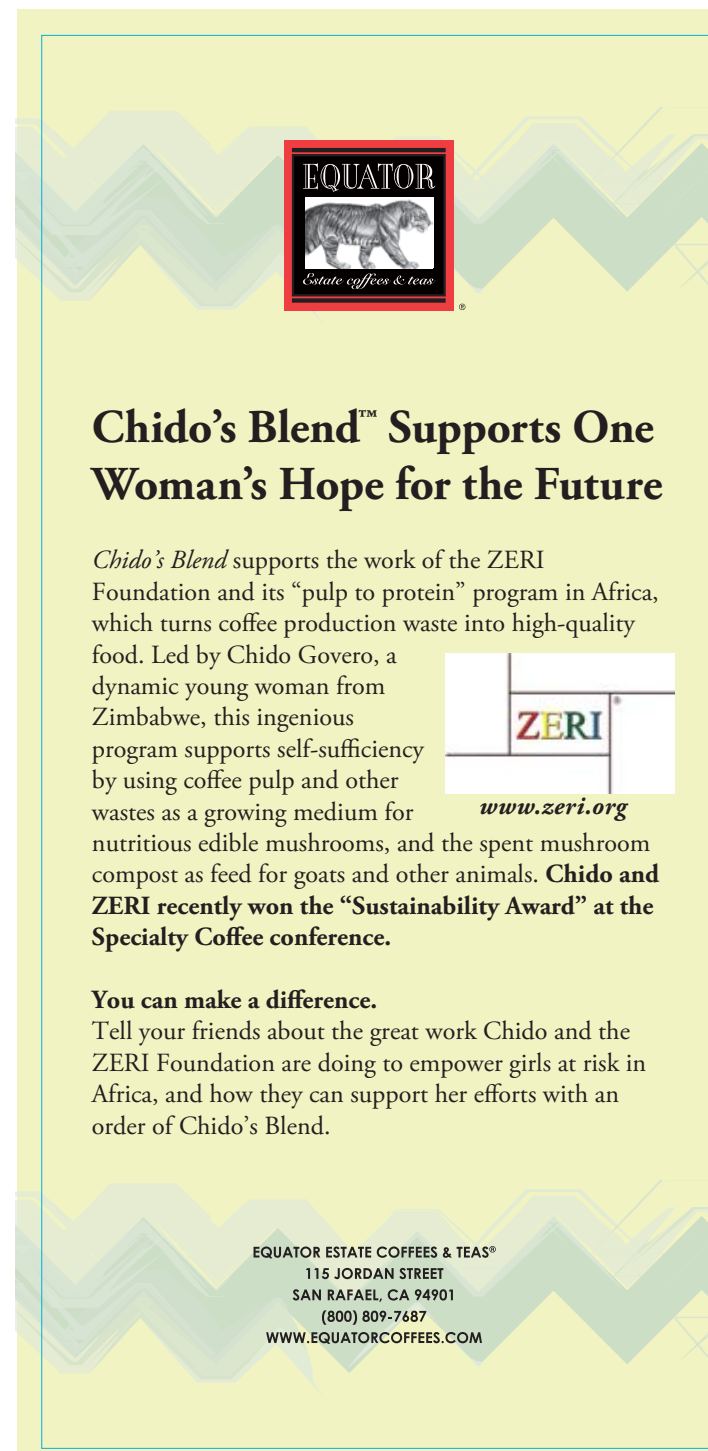
EQUATOR
Estate coffees & teas

Chido's Blend™

Zimbabwe, Rwanda and Kenya —
A blend of spice, wood, floral and fruit notes

NET WT. 12 OZ. (341 G.) ROASTED DATE: OCT 28 2008

WWW.EQUATORCOFFEES.COM 1-800-809-7687



EQUATOR
Estate coffees & teas

Chido's Blend™ Supports One Woman's Hope for the Future

Chido's Blend supports the work of the ZERI Foundation and its "pulp to protein" program in Africa, which turns coffee production waste into high-quality food. Led by Chido Govero, a dynamic young woman from Zimbabwe, this ingenious program supports self-sufficiency by using coffee pulp and other wastes as a growing medium for nutritious edible mushrooms, and the spent mushroom compost as feed for goats and other animals. **Chido and ZERI recently won the "Sustainability Award" at the Specialty Coffee conference.**

You can make a difference.
Tell your friends about the great work Chido and the ZERI Foundation are doing to empower girls at risk in Africa, and how they can support her efforts with an order of Chido's Blend.

EQUATOR ESTATE COFFEES & TEAS®
115 JORDAN STREET
SAN RAFAEL, CA 94901
(800) 809-7687
WWW.EQUATORCOFFEES.COM

That is the
real power
of your
purchasing
power

Singapore

13th of November 2009



NO waste **NO** hunger **NO** abuse **NO** sex trade

Relaunch
Export from
Zimbabwe

Cash crop
Basis for
Food
Security

Food
Security
eliminates
abuse

Save girls
from
sex trade

EQUATOR
Estate coffees & teas

Chido's Blend™

Zimbabwe, Rwanda and Kenya —
A blend of spice, wood, floral and fruit notes

NET WT. 12 OZ. (341 G.) ROASTED DATE: OCT 28 2008

WWW.EQUATORCOFFEES.COM 1-800-809-7687

EQUATOR
Estate coffees & teas

Chido's Blend™ Supports One Woman's Hope for the Future

Chido's Blend supports the work of the ZERI Foundation and its "pulp to protein" program in Africa, which turns coffee production waste into high-quality food. Led by Chido Govero, a dynamic young woman from Zimbabwe, this ingenious program supports self-sufficiency by using coffee pulp and other wastes as a growing medium for nutritious edible mushrooms, and the spent mushroom compost as feed for goats and other animals. **Chido and ZERI recently won the "Sustainability Award" at the Specialty Coffee conference.**

You can make a difference.
Tell your friends about the great work Chido and the ZERI Foundation are doing to empower girls at risk in Africa, and how they can support her efforts with an order of Chido's Blend.

www.zeri.org

EQUATOR ESTATE COFFEES & TEAS®
115 JORDAN STREET
SAN RAFAEL, CA 94901
(800) 809-7687
WWW.EQUATORCOFFEES.COM

That is the
real power
of your
purchasing
power

Going
beyond
Fair Trade
and organic

Singapore

13th of November 2009



**The same with prunings from orchards
left-over from sea, corn cobs**



Singapore

13th of November 2009



**The same with prunings from orchards
left-over from sea, corn cobs**

50 million rural jobs





**The same with prunings from orchards
left-over from sea, corn cobs**

The background of the text "50 million rural jobs" is composed of three photographs. The left photo shows a young boy in a red shirt standing in a field of tall grass. The middle photo shows a young boy in a black t-shirt standing next to a wire mesh cage filled with brown, textured material, possibly compost or animal feed. The right photo shows a group of children and a man with grey hair and a striped shirt, all smiling and looking towards the camera.

50 million rural jobs

How much food can we generate?



**The same with prunings from orchards
left-over from sea, corn cobs**



How much food can we generate?



CNNMoney.com

The village that could save the planet

How two men plan to extend the ecological miracle that is Gaviotas, Colombia, across the Third World.



Singapore

13th of November 2009



Singapore

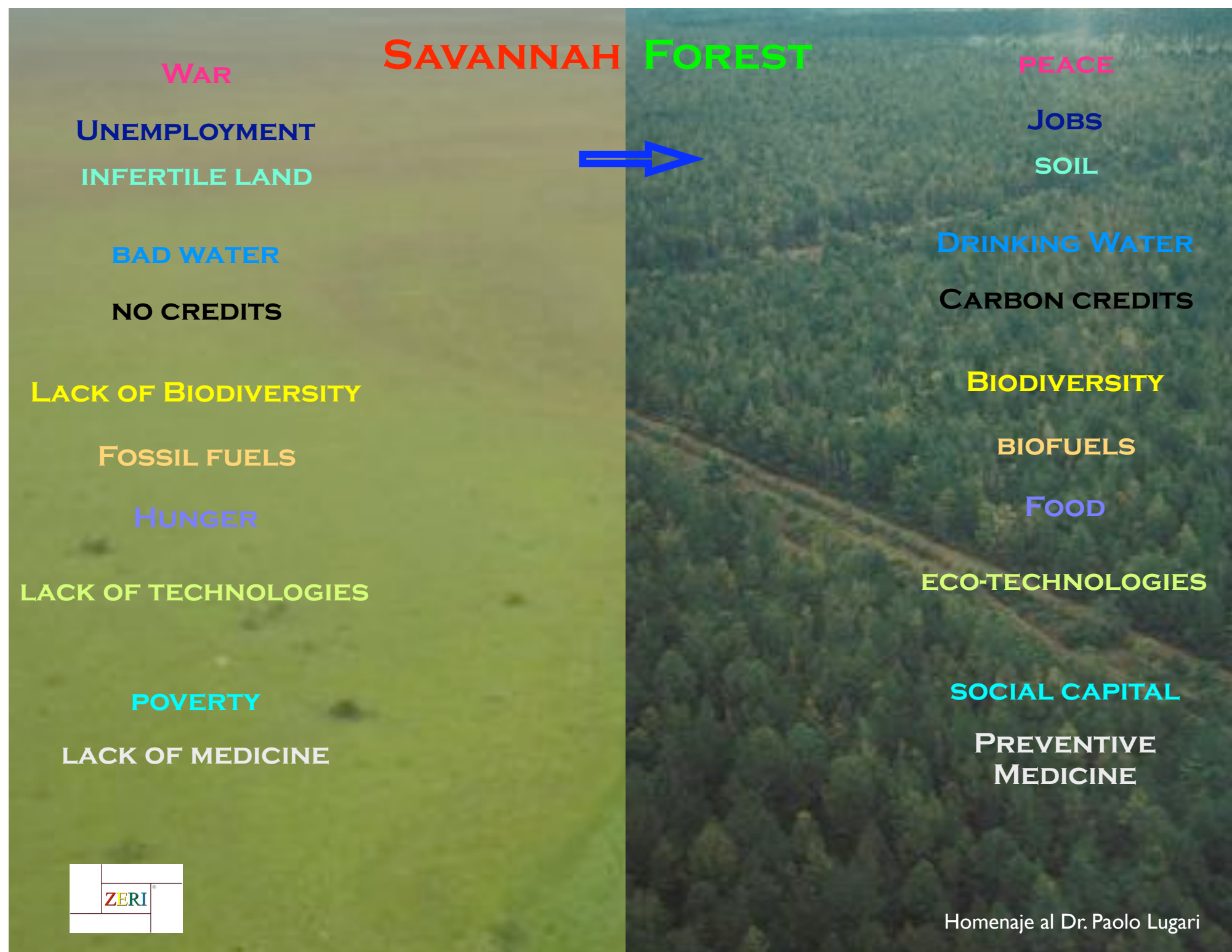
13th of November 2009

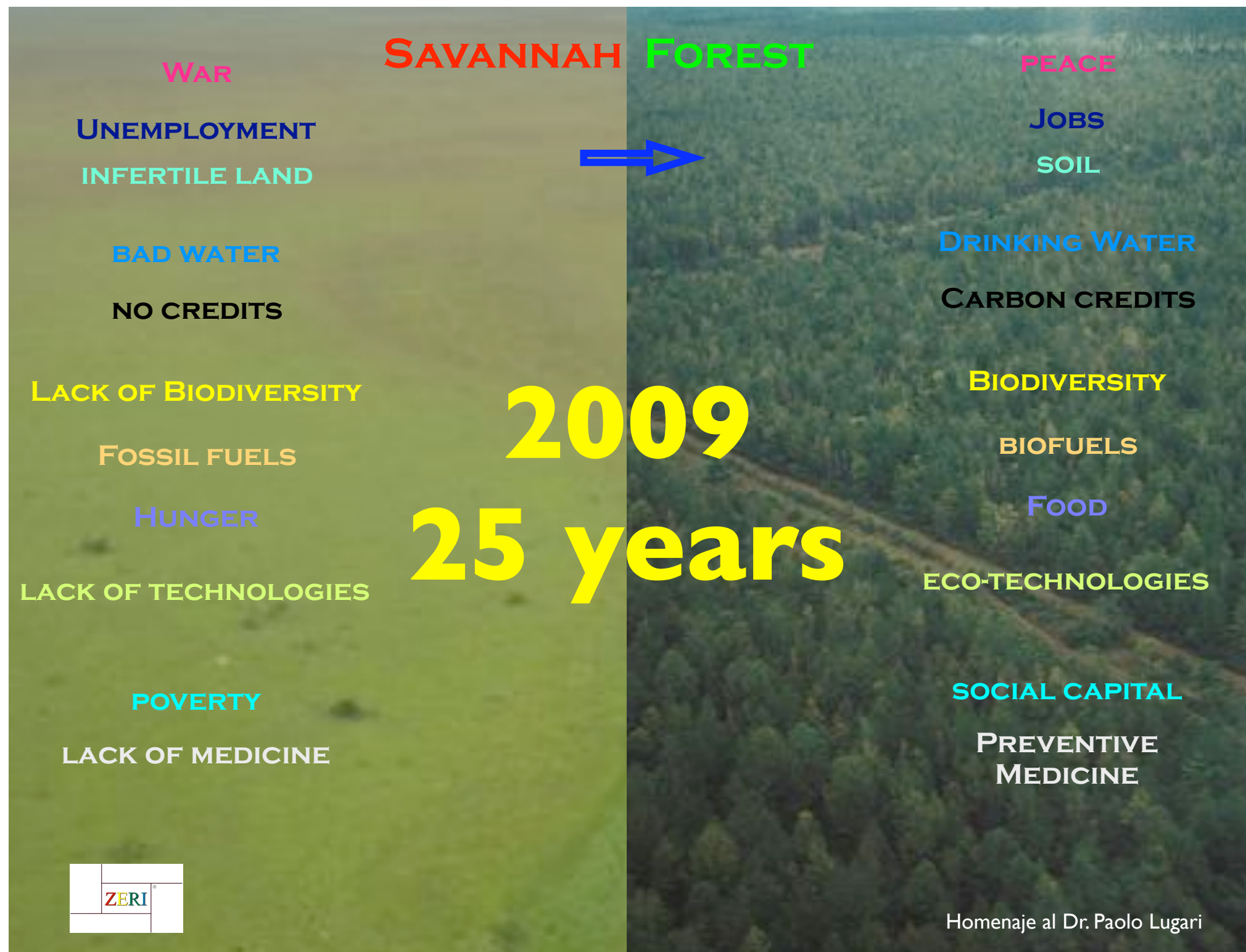


Las Gaviotas en el Vichada

Singapore

13th of November 2009







if you tank gas with biofuels
from Las Gaviotas
for the next 25 years



if you tank gas with biofuels
from Las Gaviotas
for the next 25 years

Finance the regeneration of 8 HA of rain forest



if you tank gas with biofuels
from Las Gaviotas
for the next 25 years

Finance the regeneration of 8 HA of rain forest

**Generate 200 tons of wood for paper, furniture,
housing and/or energy once**



if you tank gas with biofuels
from Las Gaviotas
for the next 25 years

Finance the regeneration of 8 HA of rain forest

**Generate 200 tons of wood for paper, furniture,
housing and/or energy once**

Fix 144 tons of CO₂ per year



if you tank gas with biofuels
from Las Gaviotas
for the next 25 years

Finance the regeneration of 8 HA of rain forest

**Generate 200 tons of wood for paper, furniture,
housing and/or energy once**

Fix 144 tons of CO₂ per year

After 3 years each year 1,200 gallons of biofuel



if you tank gas with biofuels
from Las Gaviotas
for the next 25 years

Finance the regeneration of 8 HA of rain forest

**Generate 200 tons of wood for paper, furniture,
housing and/or energy once**

Fix 144 tons of CO₂ per year

After 3 years each year 1,200 gallons of biofuel

Create 2 full time jobs



if you tank gas with biofuels
from Las Gaviotas
for the next 25 years

Finance the regeneration of 8 HA of rain forest

**Generate 200 tons of wood for paper, furniture,
housing and/or energy once**

Fix 144 tons of CO₂ per year

After 3 years each year 1,200 gallons of biofuel

Create 2 full time jobs

What more do you want?



if you tank gas with biofuels
from Las Gaviotas
for the next 25 years

Finance the regeneration of 8 HA of rain forest

**Generate 200 tons of wood for paper, furniture,
housing and/or energy once**

Fix 144 tons of CO₂ per year

After 3 years each year 1,200 gallons of biofuel

Create 2 full time jobs

Offer water for free to the local population

What more do you want?



Singapore

13th of November 2009

What more do you want?

Singapore

13th of November 2009

**COST OF LAND:
US\$ 1 / ACRE**

What more do you want?

**COST OF LAND:
US\$ 1 / ACRE**

**VALUE 25 YEARS LATER:
\$3,000 / ACRE**

What more do you want?

**COST OF LAND:
US\$ 1 / ACRE**

**VALUE 25 YEARS LATER:
\$3,000 / ACRE**

Better than an investment in Microsoft

What more do you want?



How viable is this new business model?

Some dream to escape reality



How viable is this new business model?

Some dream to escape reality
Others dream to change reality forever



Soichiro Honda

12 language
editions
including
Chinese,
Arabic,
Russian,
Korean,
Japanese
not yet in
Dutch



www.zeri.org

Singapore

13th of November 2009

12 language
editions
including
Chinese,
Arabic,
Russian,
Korean,
Japanese
not yet in
Dutch



As of February 2010
each week for 2 years
one systemic
business model
in cooperation with
the business media
AIESEC
and YES Campaign

www.zeri.org

Singapore

13th of November 2009