



Work with citizens in
geothermal green and
brownfields in Mexico, to
develop better practices

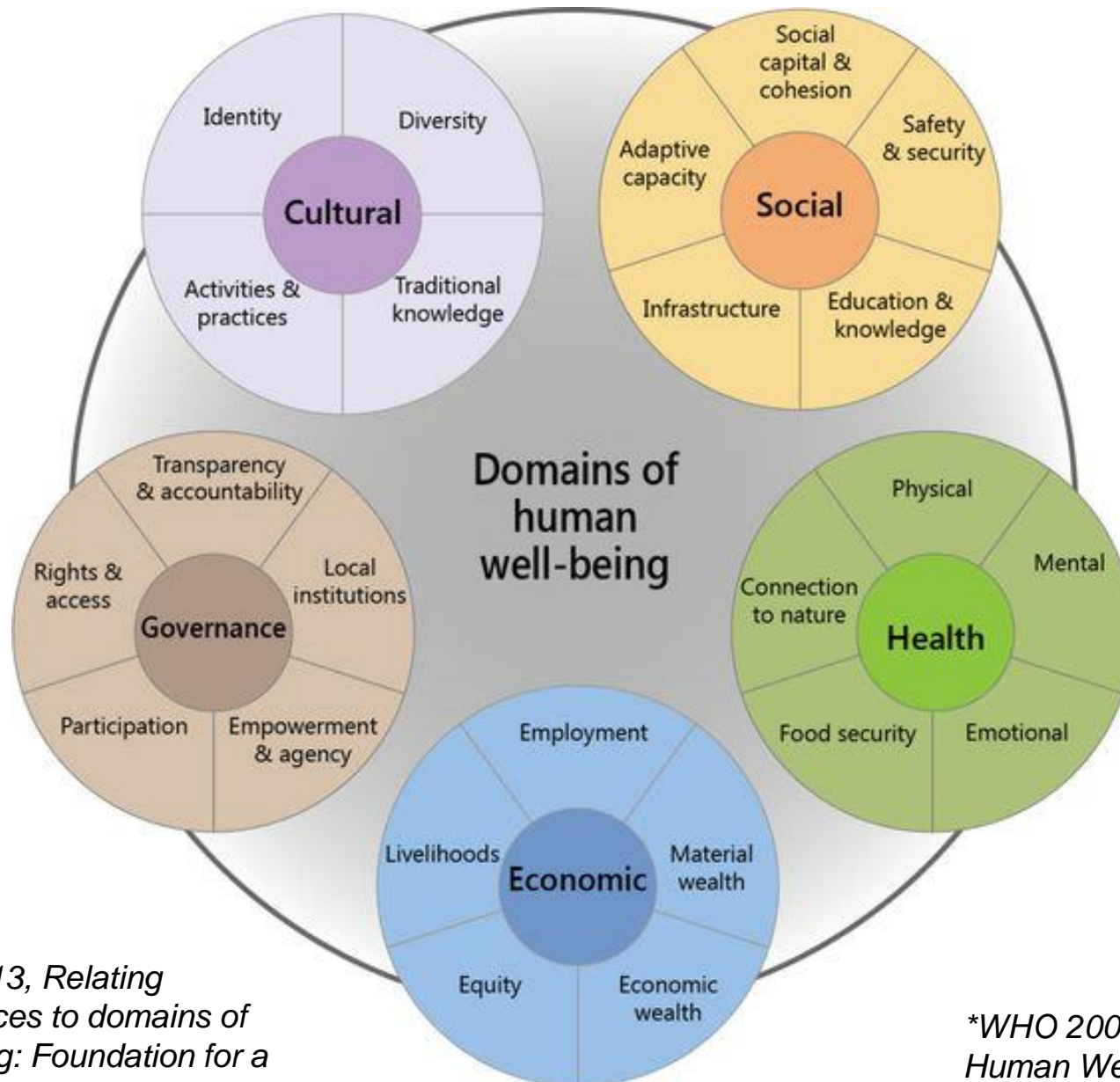
**Work Package 9. Environmental, Social
and Economic Impacts of EGS/SHGS**

Dr. Zayre I. González Acevedo

CONTENTS

- Brief introduction
- Mexican geothermal context
- Greenfield social work
- Brownfield social work
- Successful examples

INTRODUCTION



**Smith et al., 2013, Relating ecosystem services to domains of human well-being: Foundation for a U.S. index.*

**WHO 2005, Ecosystems and Human Well-Being*

MEXICAN GEOTHERMAL CONTEXT

CFE
Comisión Federal de Electricidad

Cerro Prieto

CFE
Comisión Federal de Electricidad

Tres Vírgenes

GRUPO
DRAGON

**Domo San
Pedro, Nay.**

CFE
Comisión Federal de Electricidad

Los Azufres

CFE
Comisión Federal de Electricidad

Los Humeros

Geothermal power plant	Starting date	Installed capacity (MW)	Effective capacity (MW)
Cerro Prieto, BC.	1973	727.8	570
Los Azufres, Mich.	1982	225	225
Los Humeros, Pue.	1990	68.6	68.6
Las Tres Vírgenes, BCS.	2001	10	10
Domo San Pedro, Nay.*	2015	5	5

Total installed capacity: 1,036.4 MW
Total effective capacity: 878.6 MW

***Self-supplier**

MEXICAN GEOTHERMAL CONTEXT



**Energy Reform approved in
December 2013**

**New geothermal energy law,
published on 11th August 2014**

- Multiple generators
- Interconnection to the national electrical transmission
- Clean energy certificates
- Geothermal energy law

- More exploration
- Mitigate drilling risks
- Create a center of excellence for geothermal energy (CeMIE-Geo). Created in 2014.

MEXICAN GEOTHERMAL CONTEXT



***Given to CFE, 26 exploring permits: 13 (2015), 6 (2016) and 7 (2018).**

MEXICAN GEOTHERMAL CONTEXT

The Energy Reform has fostered a paradigm shift in Mexico that proposes:

Integral development of the energy sector, **strengthening sustainability** and **human rights** approaches, in a **harmonious relationship with economic** development.

Social Impact Assessment: identification, characterization, prediction and assessment of social impacts, as well as mitigation measures and social management plans.

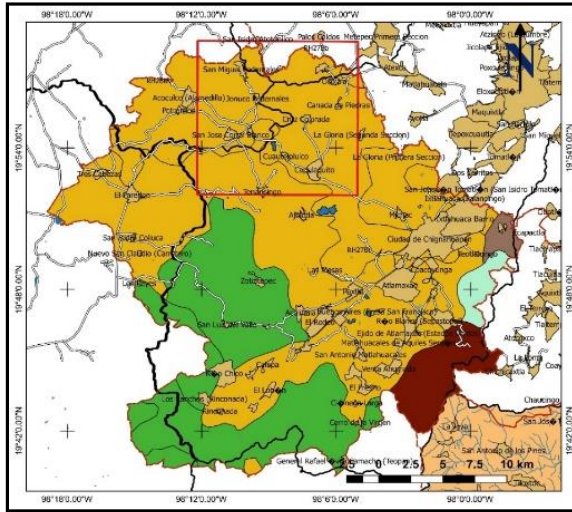
Prior consultation: in order to take into account the rights and interests of indigenous people and communities.

Acoculco, Puebla

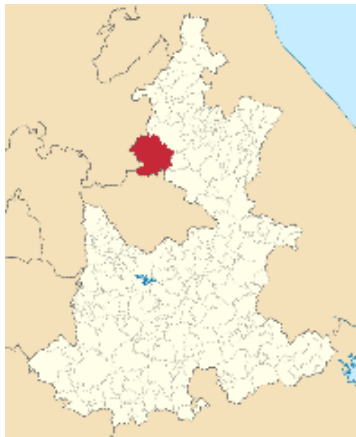
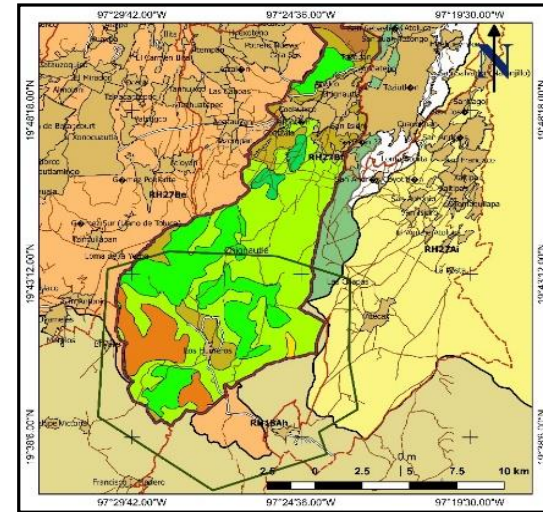
STUDY SITES

Los Humeros, Puebla

Greenfield



Brownfield



Chignahuapan
Puebla



Chignahutla
Puebla

GREENFIELD

Acoculco, Puebla

The activities of geothermal exploration started since the 80's with the drilling of one exploration well.

In year 2008, a second well was drilled in the zone and very close from the other first well.

In year 2015 with the new Energetic Reform, CFE granted a 3 years permit to perform geothermal exploratory work.

The geothermal resource in the surface is acidic and with temperatures maximum of 25 °C.

The exploratory wells have shown temperatures of more than 200 °C in depths of 2 Km.

The geology and petrology has shown low permeability in the region as part of the ancient volcanic activity in the region.

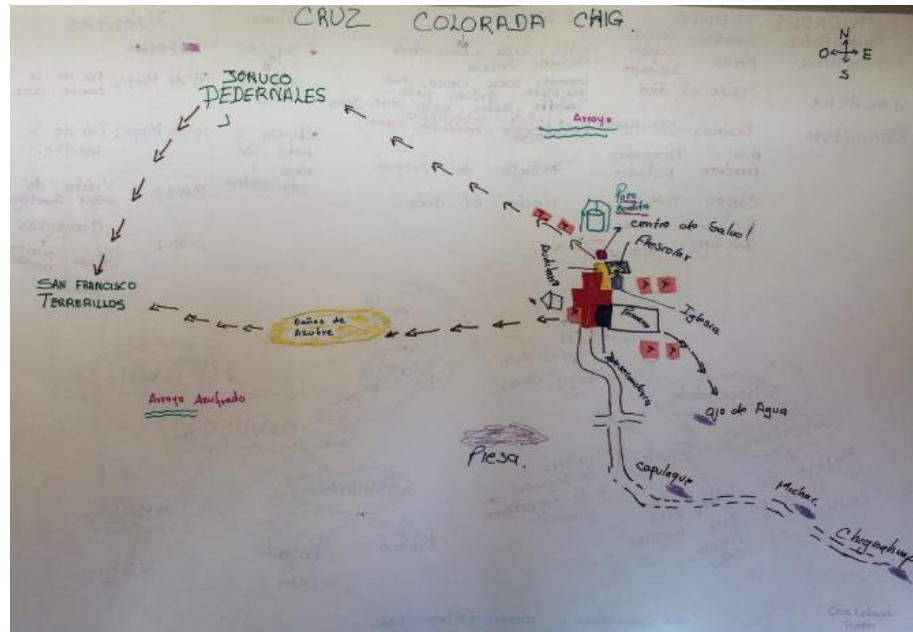


GREENFIELD SOCIAL WORK

Participative Methodologies	Strategies
Interactive information and opinion exchange processes	Semi-structured interviews, World café Mental mapping, Open Space
Multisectoral dialogue	Key actors, Women, Ejidatarios, Avecindados, Youth
Descriptive study Socio-cultural baseline	Chignahuapan, Cruz Colorada, San Francisco Terrerillos, Jonuco Pedernal, Ocojala
Quantitative Methodologies	Source of the information
Demography, Human, Physical and Economic capital	INEGI-ITER, 2010



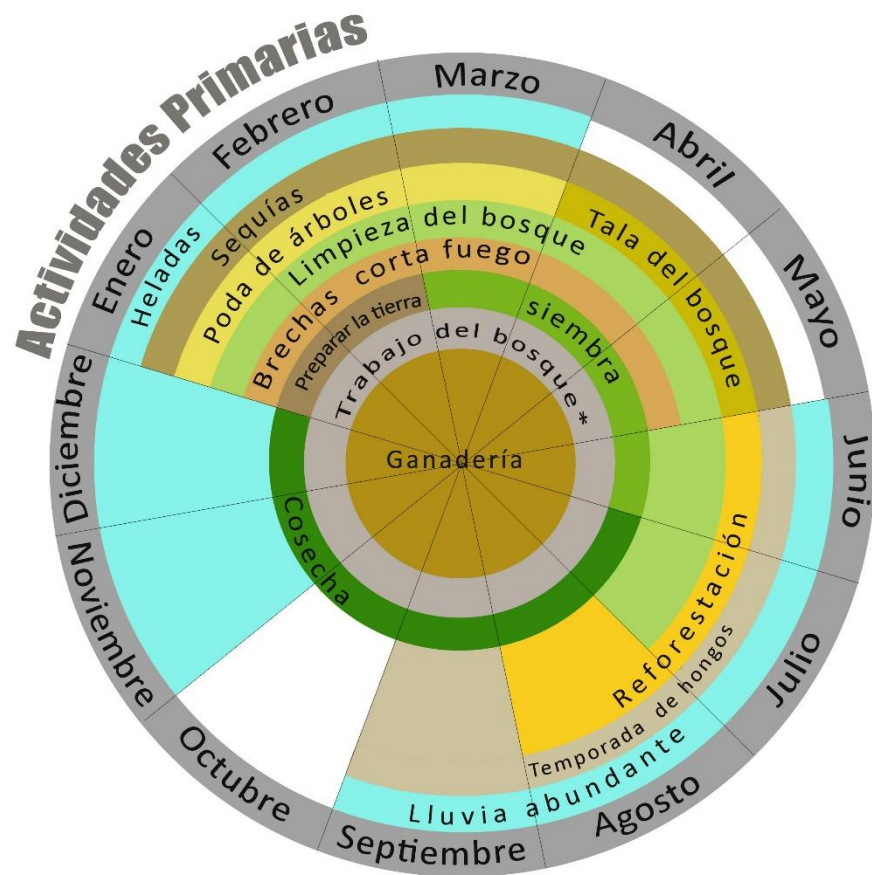
GREENFIELD SOCIAL WORK



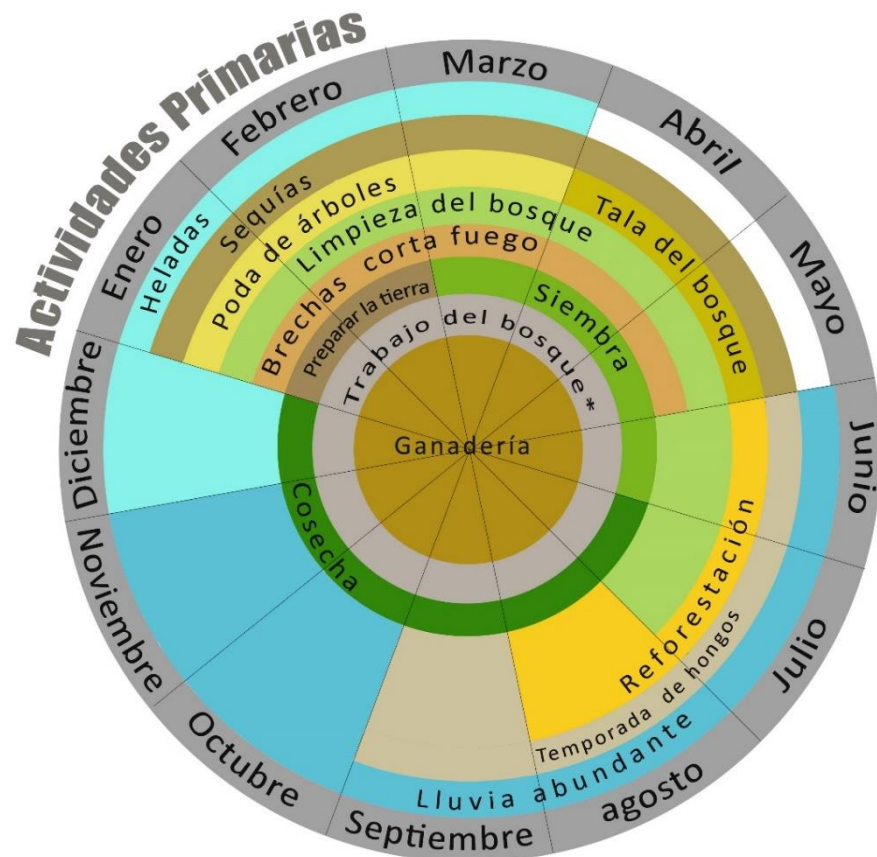
Mapa general de la zona de impacto directo, Acapulco Puebla.



GREENFIELD SOCIAL WORK

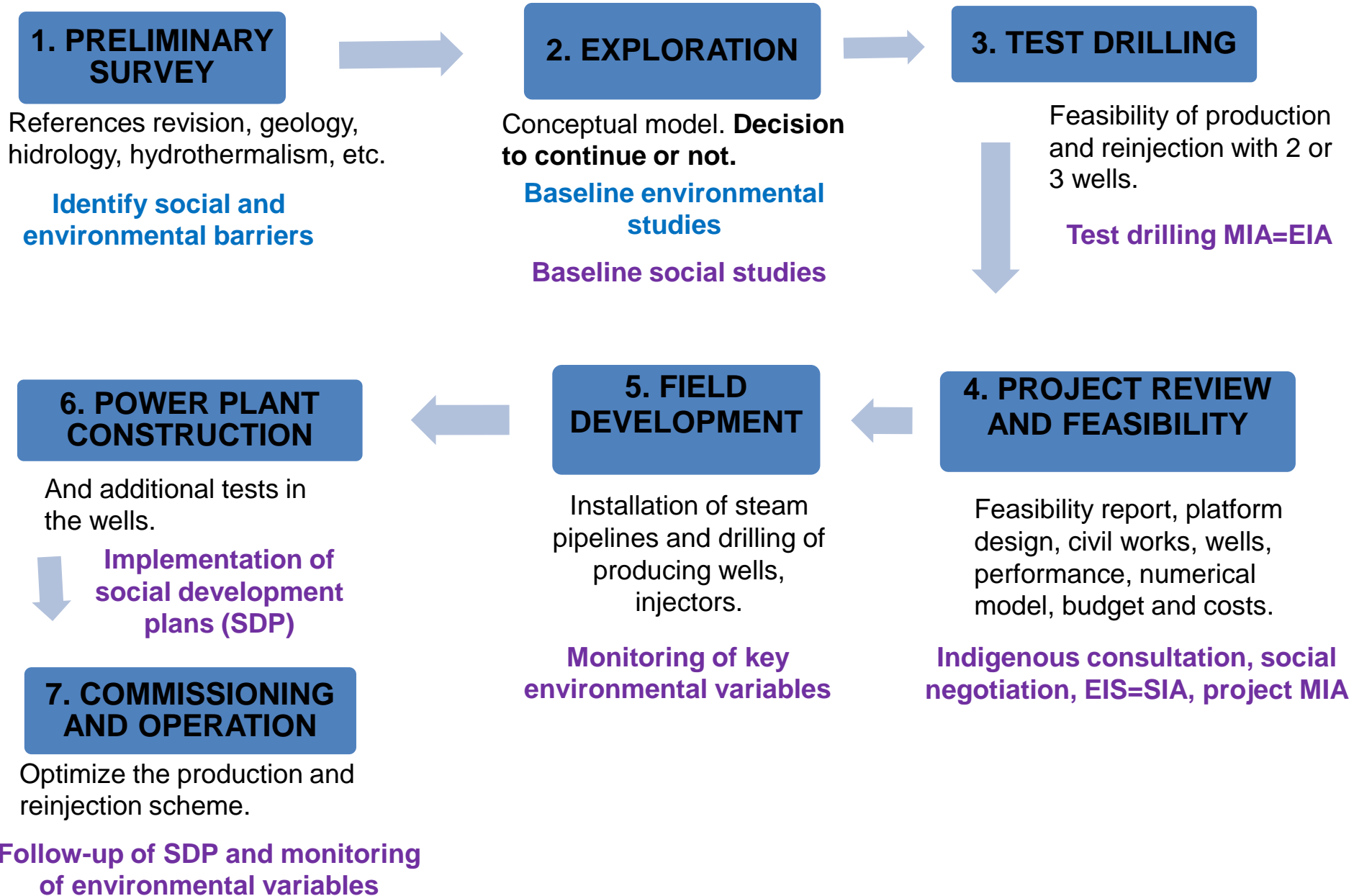


CRUZ COLORADA



SAN FRANCISCO TERRERILLOS

Geothermal Exploration Best Practices: a guide to resource data collection, analysis and presentation for geothermal projects (IGA, 2013).



BROWNFIELD

Los Humeros, Puebla

The activities of geothermal exploration started since the 80's with the drilling of one exploration well. In 1991 was the opening of the geothermal power plant.

At the beginning the local population agreed to the construction of the power plant only if no relocations take part. Therefore, the geothermal field is developed around and inside the communities.

From the beginning, the social work was limited to support with money, paint, food or even seeds for the locals, whenever they complained about it.

Since 2001, the social work was organized focused on objectives and linking environmental factors in social activities.

Nowadays, there are around 30 activities planned within the year, all tough to the social benefit and the harmony with the environment.

In year 2018 the first heating geothermal system was installed in a Kindergarden and Health Clinic.

BROWNFIELD SOCIAL WORK

Program on bioconstruction, rescue, preservation and conservation of vegetative materials.



Use of biochar in walls as a real strategy of sustainable development and good living.

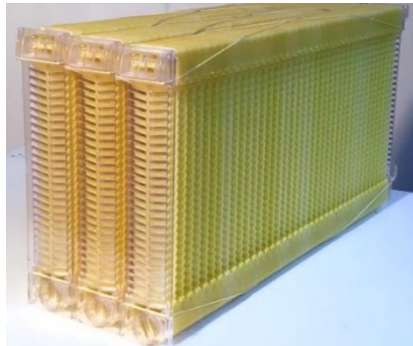
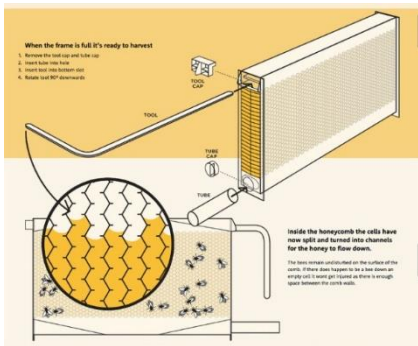


BROWNFIELD SOCIAL WORK

Painting program for the infrastructure of the village, with natural paints and base with nopal slime.



Technology adoption for productive programs in the communities



BROWNFIELD SOCIAL WORK

3º FESTIVAL DEL PULQUE

VEN A LA CALDERA DE LUZ

SONIDO "ETÉREOS"

GLOBAL understanding

Año Internacional del Entendimiento Global

Ven y adopta un Maguey Pulquero

Degusta el pulque con responsabilidad, disfruta la Fiesta

Conectar la acción local y los desafíos de escala global.

Enfocarse en la sostenibilidad global de la acción local.

Enfatizar los elementos sociales y culturales en la transformación de la naturaleza

Además te invita a participar en:

Conferencia de CFE/RLH - Fauna en protección NOM-052

3º TORNEO REGIONAL

- * Tiro con charpe - 04:00 pm (Premio Sorpresa)
- * Carrera de burros - 05:00 pm (Gana una Bomba de Motor)
- * Rayuela - 06:00 pm (Gana una Bomba de Motor)

Lugar: Casa del Campesino, Los Humeros, Chignautla, Puebla

Inscripciones 15 min antes del inicio - Premios Psicoatractivos

AYUDA A CONSERVAR Y PRESEVAR

El pulque

El maguey pulquero

La Naturaleza

Nuestra Cultura y

Los Dioses que dieron vida en la antigüedad

DIOSA MAYAHUEL

LA LUNA NO ES DE QUESO,
ES DE PULQUE

15 DE ENERO 2016

LOS HUMEROS, CHIGNAUTLA PUEBLA DE

¡ FELIZ DIA DEL NIÑO Y DEL ESTUDIANTE !

DÍA MUNDIAL DEL LIBRO Y DEL DERECHO DE AUTOR (23 DE ABRIL)

FESTIVAL DE LA INTEGRACIÓN Y RESCATE FAMILIAR

9:00 A.M. - CABALGATA A LOS HUMEROS
INFORMES EN BACHILLER HUMEROS.

2:00 P.M. - DESFILE DE LA REINA DEL ESTUDIANTE
LOS HUMEROS, CHIGNAUTLA.

5:00 P.M. - PROYECCIÓN DE PELÍCULA
EL INCREIBLE CASTILLO VAGABUNDO
SALON EJIDAL, LOS HUMEROS, CHIGNAUTLA.

6:30:00 P.M. - CONFERENCIA
"DEL TLATOANI A LOS JOVENES".
SALON USOS MULTIPLES, LOS HUMEROS, CHIGNAUTLA.

8:00 P.M. - INICIO DE MITOHTLI Y BAILE
SALON USOS MULTIPLES, LOS HUMEROS, CHIGNAUTLA.

9:00 P.M. - S.O.S MADRE TIERRA
SALON USOS MULTIPLES, LOS HUMEROS, CHIGNAUTLA.

11:00 P.M. - CORONACIÓN DE LA SEÑORITA BACHILLER
SALON USOS MULTIPLES, LOS HUMEROS, CHIGNAUTLA.

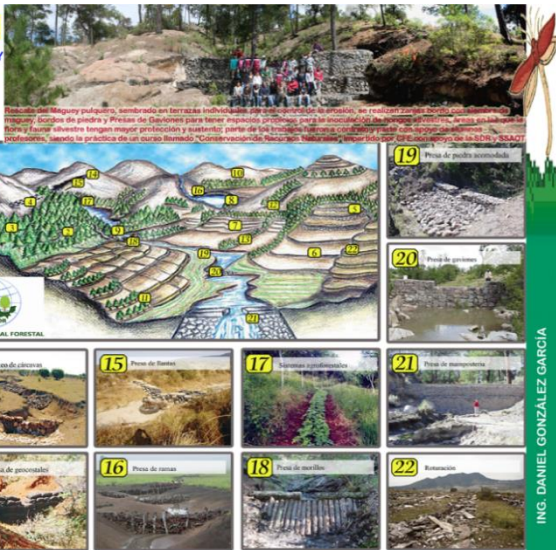
Día de integración comunitaria para descansar y celebrar la alegría de la vida, evita la envidia y la competitividad entre hermanos, nos necesitamos unidos.

29 DE MAYO DE 2015

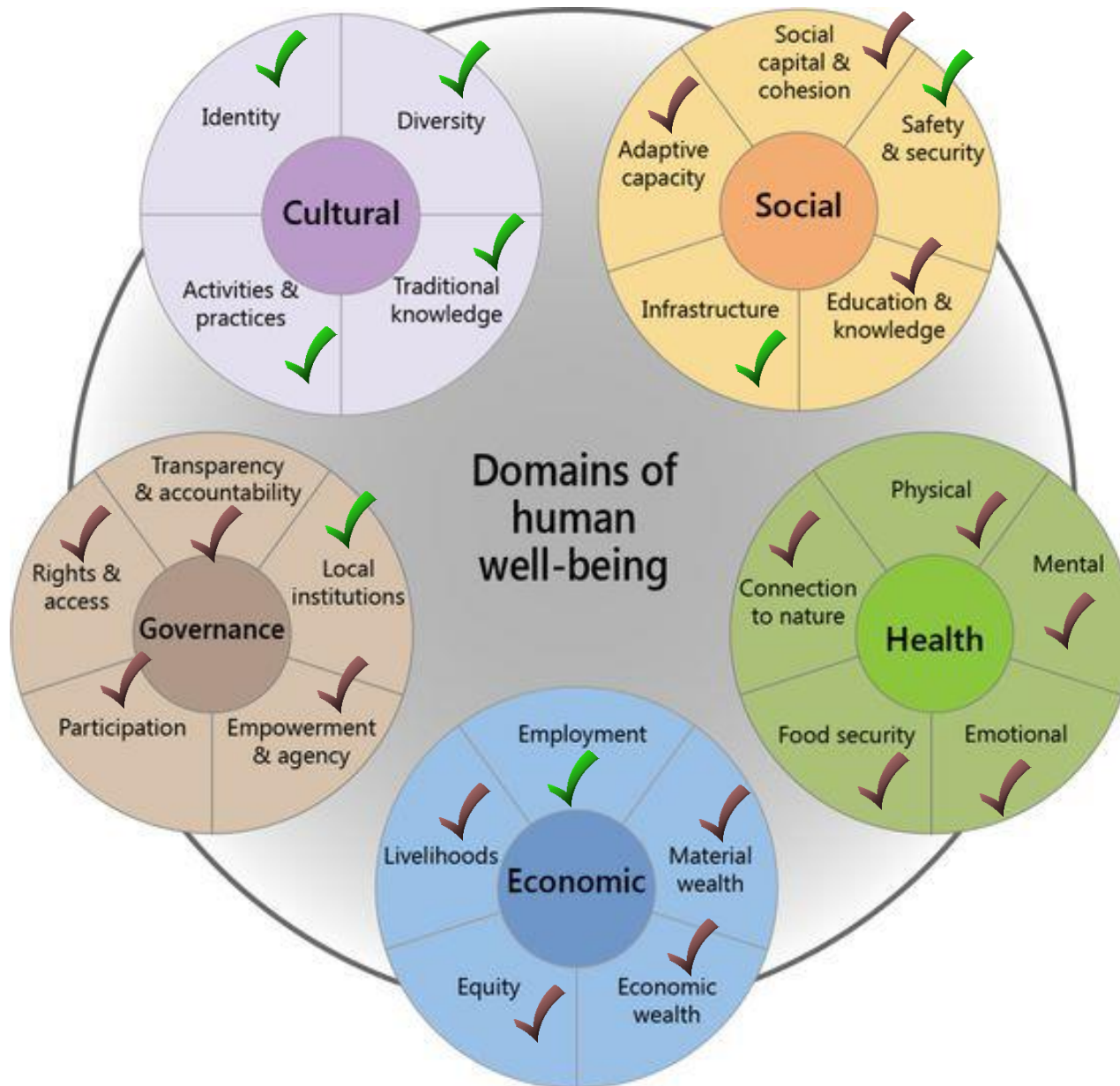
¡ FELIZ DIA DE LAS MADRES Y DE LOS PADRES !
DÍA INTERNACIONAL DE LA FAMILIA (15 DE MAYO)

¡ FELIZ DÍA DEL MAESTRO !
DÍA MUNDIAL DE LA PROPIEDAD INTELECTUAL (26 DE ABRIL)

BROWNFIELD SOCIAL/ENVIRONMENTAL WORK



Geothermal industry role



Is working



Can be improved

SUCCESSFUL EXAMPLES

Philippines



Tree for the Future



Tree for Life



Tree for Food



Tree for Leisure



BINHI

Planted and maintained
1,149 hectares of forest
land as of end 2015

200 hectares annually
up to 2018



**BIODIVERSITY
CONSERVATION
AND
MONITORING
PROGRAM**

Flora Monitoring



**FOREST
PROTECTION**

Management of Illegal
Forest Occupants near
EDC facilities

Control of Illegal Forest



**UPLAND
COMMUNITY
MANAGEMENT**

25 Upland Farmers
Association

INVOLVEMENT OF THE COMMUNITIES

Health

Health Center
Repair/Upgrade
Medicine Distribution
Focused Medical
Mission
BHW Incentives
Bloodletting Activity
BHW
training/Responsible
Parenthood Seminar

Education

KEITECH
Schools for Excellence
Brigada Eskwela
Miscellaneous Fees Assistance
Educational Supplies
Intensified Feeding Program
School Repair/ upgrade
High School /College
Scholarship
High School Career Guidance
Seminar Counselling/College
Admission Review and
Readiness Project
OJT/SPES

Livelihood

Community
Development
Skills Enhancement
Training
Livelihood Initiatives
through the
Cooperative
- Palay/Rice Trading
- Job Contracting
- Poultry Contract

Environment

Clean-up drives/Tree
planting activities
Participation to Earth
Hour Event
OTHERS:
Socio-Cultural and
External Relations
Barangay Emergency
Response Team
IFC on Disaster

SUCCESSFUL EXAMPLES

Methanol Processing Plant

30 E

Iceland

Hotel

30 E



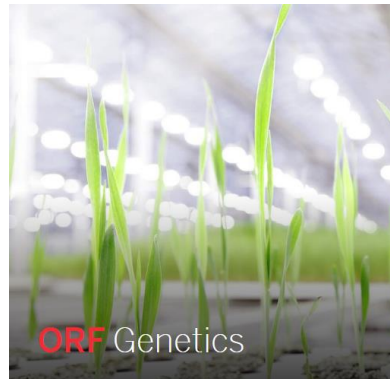
Greenhouses

30 E

Health Clinic

Fish dryer industry

70 E



Aquaculture

20 E



Geothermal power plant

60 E



SPA



ACKNOWLEDGEMENTS



Comisión Federal de Electricidad



CONACYT

Consejo Nacional de Ciencia y Tecnología



Centro Mexicano de Innovación en Energía Geotérmica



FONDO
DE SUSTENTABILIDAD
ENERGÉTICA