

**READING MATERIAL  
FOR  
COMMUNITY BASED NATURAL  
RESOURCE MANAGEMENT  
(CBNRM)**



**STATE INSTITUTE OF RURAL DEVELOPMENT &  
PANCHAYATI RAJ  
DURTLANG, LEITAN : MIZORAM**

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## LEILUNG HAUSAKNA: A AWMZIA LEH A PAWIMAWHNA (Natural Resources: Meaning and Importance)



Leilung hausakna kan tih hi khuarel a, leilunga kum tam tak kalta atanga lo insiam, mihringte tana thil tangkai takte an ni. Heng leilung hausakna kan haichhuah te hi kan lo her danglamin kan thil mamawh te kan lo chher chhuak veleh thin a ni. Mihring ten a heng leilung hausakna kan chhawr tangkai tam tak te hi ramsate leh thlai te pawhin an dam khawchhuah theih nan an mamawh ve bawk a ni. Kan nitin nunah, kan thil tih kawng engkimah, boruak kan hip luh atanga kan ei leh in zawng zawngte hi leilung hausakna atanga kan hmuh vek te an ni a, an tello chuan nunna a awm thei lo a ni.

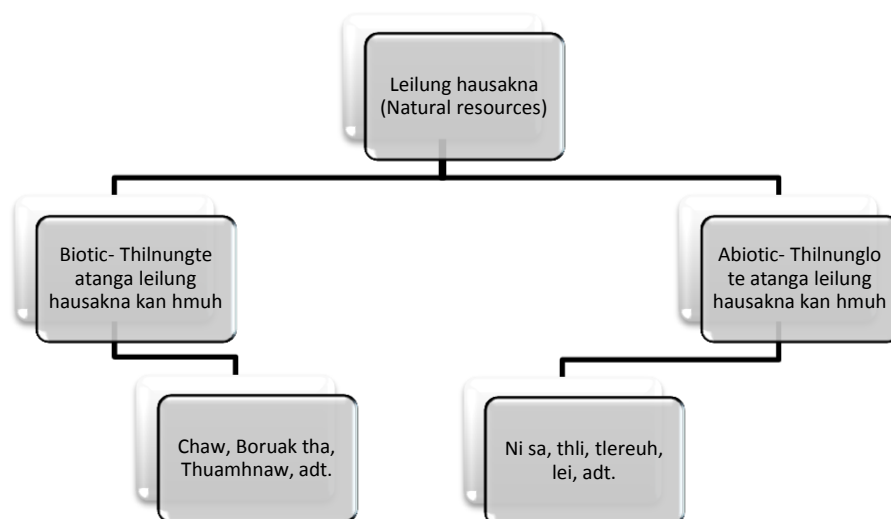
Leilung hausakna chuan heng- ni eng, boruak lum leh vawt, tui, lei leh a kaihnhawih thil zawng zawng, thlai, adt. zawng zawngte hi a huam vek a ni. Tin, leilung hausakna kan tih hian kan chhehvela thil awm zawng zawng leh hmanraw tangkai ni thei zawng zawngte hi a huam tel vek bawk. Mihring siamchhuah thil reng rengte hi leilung hausakna hmanga siam vek an ni a, a bak zawng heng- lei, tui, boruak leh ramsa; tin, tuialththei, lungalththei, lunglu leh thil dang zawng zawng lei atanga kan haichhuahte hi leilung hausakna huang chungu mi vek an ni.

Heng leilung hausakna te hi chi hrang hrangin a then hran theih a, an lo insiam chhuahna azirte (origin), an upat dan azirte (stages) leh an insiam thar leh theih dan (renewability) azirtein i lo zirho dawn teh ang u.

**A.** An lo insiam chhuahna a zirin (Origin): Leilung hausakna te hi an lo insiam chhuah dan azirin chi hnih a then theih a, chungte chu-

**1) Thilnungte atangin (Biotic):** Heng leilung hausakna te hi ramngaw (thing, mau, thlai leh hnim) leh ramsa atangte leh anmahni atanga lakchhuah theih thil kan hmuh theih te hi an ni. Heng hausakna te hi kan nunna hnar boruak kan hip luh (Oxygen) kan hmuhna leh kan nifin chaw kan hmuhna te an ni. Lungalhthei (coal) leh Tuialhthei (petroleum) te pawh hi hemi zar hnuaia dah tel ve an ni, a chhan chu thlai leh ramsa thi tawih te atanga lo insiam an nih avangin.

**2) Thilnunglo te atangin (Abiotic):** Heng leilung hausakna te hi thilnunglo leh thil tawih theilo te atanga lo insiam an ni. Heng hausakna zinga thenkhat thir lam chi ho te hi lei chhungril thuk takah an inphum a, mithiam ten khawl hmang a laichhuakin, thil tha leh pawimawh dangah te an siam veleh thin a ni. Heng hausaknate kan tih te hian- lei (land), tui, boruak leh thir lam chi heng- lunghlu (diamond), rangkachak (gold), dar, adt. a huam a ni.



**B.** An dinhmun azirin (stage of development): Leilung hausaknate hi an upat dan azirin emaw an dinhmun anzirin chi thum-ah a then theih.

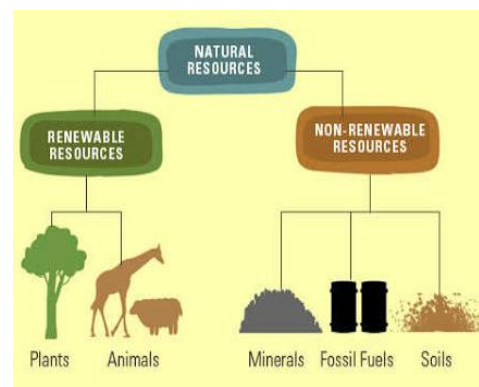
a) Hma huna la hman tur (Potential resources): Heng leilung hausakna te hi lei chhungril a awm, mahse nakin huna hman tana la khek thatte an ni. Entirnan, lungalhthei khur hmuhchhuah a ni a, mahse laih a, siakchhuah a nih hma chuan nakin huna hman atana khel khal a la ni rih tihna a ni.

b) Hman mek hausakna (Actual resources): Hei hian leilung hausakna thenkhat an hlutna, an tam lam leh an that lam (quantity and quality) chhui chian tawh leh tun huna hman mek tawh te a huam. Entirnan, tuialhthei (petroleum) tuna Bombay High Fields atanga siak chhuah mek, hman tur atana sawngbawl leh thawncchhuah mek te hi an ni. Heng hausakna te hmang tur hian sum leh thiamna khawl (technology) tha te neih angai a ni.

c) Hlawk zawka la hman theihthe (Reserve resources): Hei hian tun huna hman mek (actual resources) thenkhatte nakin lawka hlawk zawka la hman theih tura dah that te a huam a ni. Entirnan, tuialhthei laihchhuah tawh thenkhatte chu a van huna hman atan an dah tha thin. Tin, hausakna (resources) thenkhatte chu khawl lam that tawh loh vang ten la hman loh leh khawih loh in an dah thin a, chung chu "Stock resources" an ti vet hung a ni.

**C.** Hman nawn theih leh hman nawn theih loh (Renewable and Non-renewable): Leilung hausakna thenkhatte chu hman tawh hnuah an rawn in siam thar leh zel thei a, a then te erawh hamn zawhah an ral mai thung.

i) Hman nawn theih (Renewable resources): Heng hausakna (resources) te hi anmahni tawkin an



insiam thar leh zel thei a ni. heng- Ni zung chakna, boruak, tui, thli, adt. hi mihringten hmang nasa viau mah ila kan mamawhchu kan phuhru zo tho a ni. A thenkhatte chu rang takin insiam leh zung zung thei ni mahse kan hman nasat chuan an khawbaw zo ve thei tho a ni.

ii) Hman nawn theih loh (Non-renewable): Heng hausakna te hi muangchangin an insiam nawn leh thin a, a thente phe chu an insiam nawn leh tawh ngailo. Lunghlu laihchhuah kan tih mai te hi entirna lar zual deuh te an ni. Heng lunghlu leh dar kan laihchhuahte hi kum sang tam tak lei hnuaid lo insiam tawhte an ni a, an insiam nawn nan chuan kum sang chuang baw a mamawh leh dawn a ni. Hetiang hi an dinhmun a nih avangin renchem taka hman loh chuan hun reilote hnuah hman tur an awm lo zo mai dawn a ni.

#### LEILUNG HAUSAKNA PAWIMAWHNA TE

Kan sawi tawh angin leilung hausakna te hian kan nitin nun leh hun hman an thunun tih theih a ni a, an tel lo hian minute khat lek pawh kan awm thei lo tih hialin a sawi theih ang. An pawimawhna te chu chipchiar zawkin ilo thlir ho dawn teh ang.

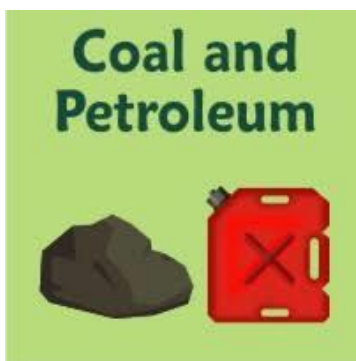
1. Kan nunna hnar boruak tha (oxygen) min pe: Kan dam khawchhuah nan leh kan taksa in tha taka hna a thawh theih nan boruak tha (Oxygen) hi kan mawmawh ber a ni a, he boruak tha (oxygen) hi thing leh hnim hring atangtein kan hmu a ni. Kan pian tirh ata tawh a thlawn oxygen kan dawn te hi a man han chhlar dawn ila chu rul zo tumah kan awm hlek lovang.



2. Kan ei tur chaw min pe: Kan than len nan leh thahrui chakna kan neih theih nan chaw ei kan mamawh a, chung kan chaw tha ei te chu thlai

leh ramsa te atangin kan hmu a ni.

3. Bungrua leh insakna hmanrua min pe: Insak nana kan hman thing leh mau zawngte hi ramngaw atanga kan hmuh te an ni a, chenna atan leh inhumhimna atana kan mamawh zawng zawngte min pe a ni.



4. Tuihlthei (petroleum) leh lungalhthei (coal) min pe: Lirthei, rel, lawng leh thlawhtheihna zawng zawngte hian tuihlthei (petrol and diesel) an mamawh vek a, heng an mamawh te hi leilung hausakna atangtea kan hmuh an ni. tin, rel thenkhat, lawnglian leh thil siamna hmunpui (industry leh factory) ah te hian lungalhthei (coal) an hmang nasa em em bawh.

5. Chakna thahrui (energy) min pe: Leilung hausakna hmang tangkai hian kan nitin mamawh heng- kawlpheha te, ni zung chakna (solar energy), thli chakna (wind energy), tui chakna (water resources/energy) leh adt. kan hmu bawh a ni.



6. Tlereuh leh thuamhnaw te min pe: Lei hnuai atanga lunglu leh rangkachak an laihchhuahte hmangin tlereuh eng ilo fahran te kan siam chhuak. Tin, thlai leh ramsa atangte pawhin thuamhnaw inbel tur te kan siamchhuak bawh.

## LEILUNG HAUSAKNA LUANGRAL (Natural Resources Depletion)

Mihringte hian kan damkhawchhuahna atan kan chhehvel a thil lo awmsa hrang hrang te hi kan mamawh a. Thil chhiava mai mai anga kan ngaih pawh her danglama hmanraw tangkai zawk a kan chher chhuah khan hausakna (resources) ah kan chhiar tel ve mai zel a ni. Leilung piantirh ata tawh leilung hausakna te hi chinlemneilovin (Over-exploitation) kan lo hmang tawh a, kum sang tamtak liam hnuah hian heng kan leilung hausakna te hi an chereu in an lo luangral (deplete) zo ta! Kan duhamna te leh chintawk kan hriatlohna te chuan awlsam taka insiam thar leh zung zung mai thei an nih lohzia te, hman luata chhe thei an nihzia te min theihnghilhtir zo ta!

Tin, he leilung hausakna chereu leh luangral hi mihringte chauh thlen a ni bik lova, khuarel chhiatna (natural calamities) leh anmahni tawka chereu (natural extinction) te pawh an ni ve bawk. Heng leilung hausakna te hi eng thil ten nge lo tichhia a, eng nge a nghawng tih te i lo zir ho dawn teh ang.

### KHUAREL (NATURAL DEPLETION)

1. Khuarel chhiatna (Natural calamities): Khuarel chhiatna hi khawvel hmuntin maiah a thleng vek a, heng thil te hian mihringte mai bakah nungcha te leh thildang tam takah chhiatna leh harsatna a thlen bawk a ni. Heng chhiatna thlengte hi leilung hausakna tichereutu lian berte zinga mi an ni. Heng- leimin (landslides), tuilian (Floods), Kangmei (forest fire) leh adt. hi nungcha tam tak nunna suattu leh tichereu tute an ni.





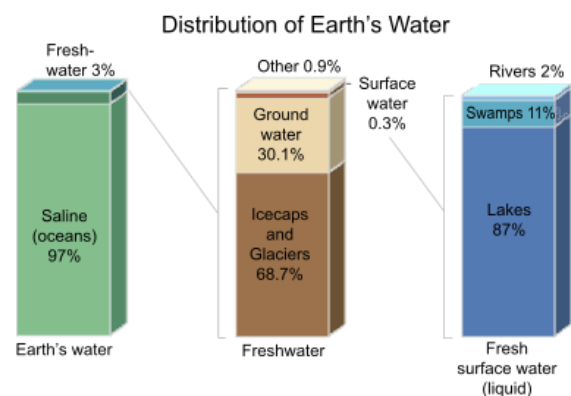
2. Heng chhiatna thlengte hian nungchate tawmhimna leh chenna hmun tam takte chu tichhia in nungcha tam takin an tawrh phah a, a thente chu hmundangah te pemin an lo chereu zo thin a ni.

3. Natural extinction (Khuarel vang a chereu): Nungcha tam takte erawh chu anmahni tawkin khuanu ruat angin an chereu ve thin bawk a. Hman ata tawh nungcha thenkhatte chu kawppui neih loh vangte, tin, kan humhalh that tawh loh vangte a chereu an ni tlangpui. Nungcha chi tam takte chu he leiah hian hmuh tur an awm tawh lo a ni.

**MIHRINGTE VANG (Man-made Depletion)**

1. Uchuak taka hman (overuse/irrational use): Khawvel ram hrang hrangah hmasawna a thang chak hle mai a, chumi um phak tur leh mihringte mamawh puhru turin kan leilung hausakna heng- tui leh tuialthethi te chu chinlem nei lovin kan hmang ta chiam chiam mai a, hei hi kan leilung hausakna kan tihchereuna lian tak pakhat a ni. Entirnan; lirthei sil na atan a renlo tak a tui kan hmang teuh teuh ang chi te hi.

Eng nge nghawng a neih? Khawvela tui awm zawng zawng za zela 97 te hi chu tuifinriata tui al, ei tlak loh leh hmantlak loh an ni a, za zela 2 te chu vur tlang te an ni leh a, a la bang zaa pakhat chiah hi tui thianghlim in tlak a ni. kan kham khawp lo hle a ni.



2. Ramngaw tih chereu (deforestation): Ramngaw atang hian boruak thianghlim hip luh tur kan hmu a; insakna bungrua leh thing tuah tur te leh thildang tam takte kan hmu bawk a ni. Mihringte hian kan mamawh puhruk nan heng ramngaw te hi kan kit thlu nasa em em a; thing pakhat than len nan kum tam



tak a duh a, an than len hun pawh nghak lova duham taka heng ramngawte kan thiah hian nasa takin a ti chereu a ni. Mithiam te chuan 'thing 1 kan kih reng reng in tiak 3 zel kan phun leh thin tur a ni' tiin an lo sawi hial thin a ni.

*Engvangin nge ramngaw te chu kan thiah?*

- a) Khawpui thang zelah mipui (population) an lo pung ve zel a, hei hian loh theih lohvin chenna tur hmun atan thing leh ramngaw te chu min thiah tir thin.
- b) Insakna tur bungrua leh eirawngbawlnaa tuah tur thing (firewood) kan lakkhawmnaah thing leh mau tam takte kan kit ruih ruih a, hei hian nasatakin a ti chereu a ni.

- c) Thil siamna hmunpui (Industry leh factory) bun na tur hmun atan a rampalaileng leh khawpui atang a penhle deuh hlek hmun te kan thiat nasa in ramngaw tha tak tak kan luahlan nasa hle a ni.



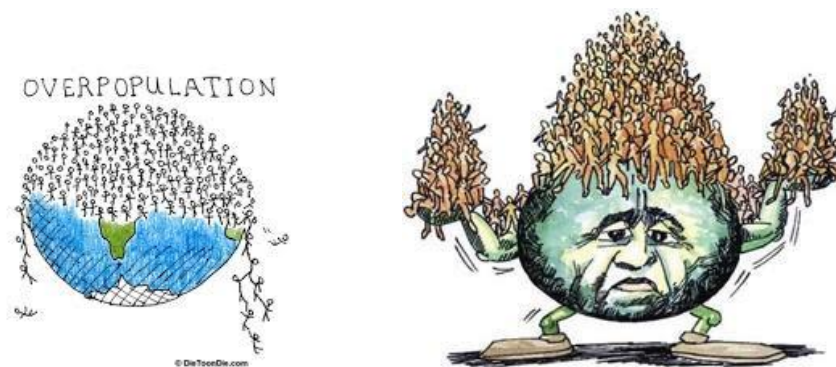
- d) Tlangram loneih (Shifting cultivation) a vangin thing leh mau tam takte ti chereuin kan hal ral thin a, hei hi ramngaw ti chereutu leh boruak ti bawlhhlawhtu lian tak a ni.

3. Mipui pung zel (population growth): Khawvel thang zelah mihring chengte pawh kan lo pung tawlh tawlh a, hei hian harsatna namen loh min thlen mek a, chung zinga pawl ber pakhat chu leilung hausakna a ti chereu tel hi a ni.

- i) Khawvel mipui pung zel avangin kan mawh hrang hrang te a pung chho ve zel a, chung kan mamawh puhruk tur chuan puankawp sawr ang maiin kan leilung chu a theih ang angin kan sawr tluk tluk a ni ta ber mai a. Leilung hausakna atheih ang a tam sawrchhuah kan

tumna lamah hian kan chenna hi kan ti chereu ve mek zekl bawk si a ni.

- ii) Mipui kan pun zel avang hian chenna tur hmun kan mamawh belh zel a, chuvang chuan ramngaw dur pui puite thiah an lo ngaih phah fo thin a ni.
- iii) Mipui pung zelah inchhung khura kawlphehtha (electricity) mamawhna a lo sang zel a, thil siamna hmunpuiah (industry leh factory) pawh an mamawhna te phuhru turin lungalhthei dah that tam takte hman ral an la ni thuai ang.



*Leilung hausakna tih chereuvin a nghawng te (Consequences of natural resources depletion):*

Leilung hausakna kan tih chereu hian nghawng tam tak a nei thei a, mihringte, nungcha te leh thlai te thleng in a nghawng thin a ni. Kan chhehvel boruak vawng fai tu, ei leh in tur tha min petu, kan khawsak tiawlsam a, zin vei vah ti awlsam tu, kan incheina leh thuam zawng zawng hnar kan tih chereu hian eng ang harsatna tak nge kan tawh theih ilo thlir ho ang u.

1. Ramngaw tih chereu (Deforestation): Ramngaw kan tih chereu hian ramngaw dur pui puite kan thiat in kan daidarh a, hei hian heng a hnuacia tarlan harsatna te hi a thlen thei.

i. Thlai thar lamah (Productivity): Thing leh mau kih/ suat hian lei chunglang hangtha kalral tur (Soil erosion) vengtu kan ti chhia a ni zel mai a, chuvang chuan thlai chinna atana tlak loh ram; rambua leh ram chhia te a lo awm phah thin a ni. Leichunglang luang ral avang hian lei in a tharchhuah theihna (Productivity) nasa takin a nghawng in hlawk taka thlai thar thei tur chu a zahve laiin a tlakhniam tir phah thei.

ii. Khaw lum leh vawt (Temperature): Thing leh mau kih hian khua a tilum zual zel in global warming avang a harsatna hrang hrang kan tawk chho mek zel a. Ozone pawp leh green house effect te avangin chhiatna dang neuh neuh thleng thei tam tak a awm bawk a ni.

iii. Nungchate leh ramngaw (Biodiversity): Thing leh mau tih chereu hian nungchate chenna tur ngaw a ti chhia a, hemi vang hian nungcha tam takte chu chenna leh eitur neihloh vangin an chereu mek zel a ni. Hei



mai bakah hian, thlai thenkhat chu anmahni in an tiak mai thei thinlo a, ramsa leh sava ten a chi an ei a an paihawih phawt te a ngai thin a. Heng thing/ thlai rah eitu ramsate an chereu vang a thing/ thlai khawvel atang a chereu zo ta eng emaw zat sawitur a awm tawh a ni.

iv. Hriselna (Health): Boruak thianghlim min petu ramngaw kan tih chereu thin avang hian boruak hrisello in kan chhevvel an luahkhat nasa a, hei hian kan hriselna kawng tamtakin a tih khawlo thei. Khawpui thenkhatah phei chuan boruak thianghlimloh em vangin hmaikawr vuah a lenchhuah a ngai hial tawh a ni. Tin, ozone pawp avangin nizung natna te kan tuar nasa chho zel a, vun cancer leh chuap cancer te natna tlanglawn tak a rawn ni chho ta mai hi kan chenna leilung leh boruak kan dimdawi loh vang a kan tawh a ni.

2. Ruahtui (Rainfall): Ramngawte hi kan chenna a tui kal kualna (Water cycle) kawng a pawimawh em em a ni a. Ramngaw te hian a chhehvel boruak lo ti dai in ruahtui a tlak tam theih nana kawng hawngtu pawimawh tak a ni.

3. Tuialhthei (oil & petroleum): Tuialhthei lei hnuai atanga kan siak chhuah te hi ral thei leh insiam nawn leh mai mai theilo an ni a, renchem lo taka hman hian harsatna lian tak ahnuaiia tarlante hi kan hmachhawn thei:

a. Tuialhthei hnianghnara a awm loh chuan nasatakin kan nitin nunphung a khaihlak ang a, kan zin veivahna leh sumdawwna ah harsatna namenlo in min tlakbuak thuai dawn a ni.



b. Tuialhthei kan renchem loh chuan kan mamawhna sang zel puhruk tumna lamah kan leilung hi kan tichhe thuai ang a, chuchuan ei leh bar kan mamawh nasatakin a nghawng ngei bawk ang a, tam leh khawkheng kan hmachhawn mai dawn a ni.

4. Dam khawchhuah nana beih (Struggle for existence): Pu Mahatma Gandhi chuan ` Khuarel hian mitin mamawh tawk puhruk thei mahse mitin duhamna erawh a puhruk theilo a ni' (*earth provides enought to satisfy every man's needs, but not every man's greed*) tiin a lo sawi tawh a, kan mamawh bak a leilung hausakna neih tuma kan intlansiakna hian kan leilungah nghawng thalo tak nei theiin hun reilote lo kal turah chuan kan damkhawchhuahna tur a kan neih chhun chhun leilung hausakna inchuh hian buaina zakhua kan la hmachhawn in a dingchangchnag damkhawchhuahna khawvelah kan let leh thei a ni.



## CLIMATE CHANGE: GLOBAL WARMING: GREENHOUSE EFFECT

**WEATHER Vrs CLIMATE:** Weather leh climate hi sawi pawlh awl tak thil inang chiah si lo a ni. Weather chu *'hun rei lo te chhung, minute hnih khat lek te, ni hnih khat emaw kar hnih khat chhung a khaw awmdan'* sawina a ni mai awm e. Climate chu *'hun rei tak chhung, kum 20/30 chhunga sik leh sa kalphung emaw awmdan emaw sawina'* tiin sawi ila a fiah mai awm e.

**CLIMATE CHANGE:** Climate change chu sik leh sa hunbi emaw nihphung inthlak tihna a ni mai awm e. Khawvel hmun hrang hrang in sik leh sa kan dawn dan a inang lova, hmun thenkhat ah nipui an hman lain hmun dang tan thlasik a ni thei. Chutihruai in, kum tam tak chhung hun in a her chhuahpui thin ang nilova sik leh sa a lo inher danglam hian *'climate change'* kan tih chu a lo awm tihna a ni. Ram/hmun vawt tak ni thin, vawt ta lo tial tial te, ruahtui tlak thatna hmun thin ruahtui tla mumal ta lo te, a kum tel a ram/hmun lum tial tial te hi *'climate change'* entirna chu a ni. A nihdan thin pangngai pel a sik leh sa a lo danglam hian *'Climate change'* a thleng tiin an sawi thin. Sik leh sa inthlak in a ken tel thil langsar zual deuh deuh te lo chhui zui dawn ila..

**GLOBAL WARMING:** Sik leh sa inthlak (Climate change) in a ken tel zinga langsar ber pakhat chu *'Global warming'* hi a ni awm e. Global warming tih chu khawvel lumna chawhrual lo sang ta sawina a ni mai. Khawvel hmun hrang hrang hi a inang lo a, an lum



leh vawh dan a inang hek lo.

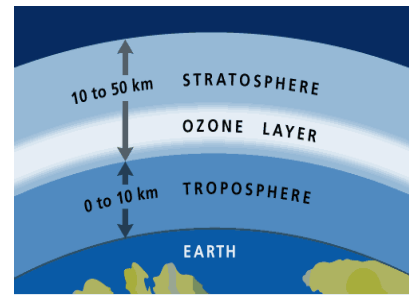
Hmun pakhatah lum hle mahse

hmun dangah a vawt a; chung zawng zawng la khawm chuan khawvel pumpui lumna chawhruala a hma aia a lo lum ta a nih chuan global warming a lo awm ta tihna a ni.



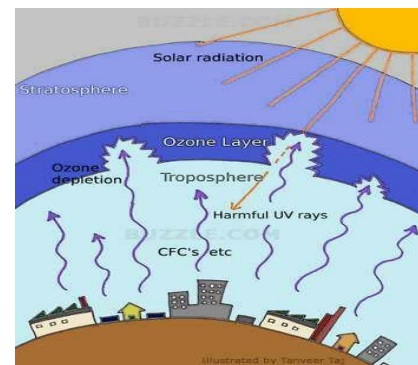
## GREENHOUSE EFFECT:

Greenhouse chu darthlalang emaw puan In, a chhunga thlai an chinna hmun a ni a; darthlalang In a nih avangin ni zung a rawn kal tlang thei a, engemaw zat chu pawn lam ah a chambang ve baw. In chhung a lo thlen hnuah ni zung chu a inkhawh let veleh a,



a then chu darthlalang tawn tlangin van boruakah a inkhawh chhuak a, a then erawh chuan an tawn tlang ve zo lo a, in chhungah chuan a chambang ta a, in chhung boruak chu a tilum mai thin a ni. Kan chenna khawvel pawh hi chutiang deuh chu a ni a, hetiang a boruak leh ni zung in chet vel dan hi a nihphung pangngai ah chuan mihring leh leilung tan a tha taw. tura khuanu duan sa a ni. Greenhouse chung darthlalang aiah khan boruak bawlhhlawh a awm ve ta thung a, ni zung chuan a rawn tawn tlang ngei a; mahse ni zung thenkhat inkhawh let tur chu boruak bawlhhlawh chuan a lo dan tak avangin khawvel chu a tih lum belhchhah ta a. Khawvel boruak lumna tizualtu leh thlentu ber chu boruak bawlhhlawh (greenhouse gas) an tih te chu an ni.

Heng boruak bawlhhlawh greenhouse gas (CO<sub>2</sub>, methane etc.) an tih te hi mihring in kan thil hman leh siam atangte, leilung in a ken tel atang te in a chhuak nasa a. Van theng reng ah han thamral ta mai lovin, khawvel tuamtu boruak ah an chambang ta hlawm a ni. Chutiang a chambang te chuan lei atanga



lumna van lama let leh tur kha a lo hip beh thin avangin lei lam boruak chu a nih tur ang aiin a lum ta tial tial a, 'global warming' chu a thleng ta a ni tiin mithiam ten an sawi.

## GREENHOUSE GAS TE CHU ENGTE NGE NI:

- i) **Carbon dioxide:** Khawvel lumna thlentu zinga a bulpui leh langsar tak chu Carbon dioxide hi a ni. Carbon dioxide hi petrol/diesel etc.

hmang chi motor leh khawh atanga chhuak a tam ber a, ram changkang apiang ah a nasa emaw tih tur a ni. Mizoram ah chuan Lo halna atang hian carbon dioxide hi kan pechhuak tam ber in a rin theih a, khawpui ah chuan motor khu atang in a nih a rinawm. Tin, ram ngaw chereu nasa lutuk hian boruak a carbon dioxide a tih tam phah em em a ni.

- ii) **Methane (CH<sub>4</sub>):** Carbon dioxide dawta pawh khawhtu lian tak chu Methane hi a ni. Boruaka lumna lo hip bet tur hian Carbon dioxide ai khan a let 20-in a thawk hlawk zawk niin mithiamte chuan an tarlang. Methane hi leilung atanga lo piangchhuak (natural) leh mihring in lungalhthei (coal) kan hal khu atangte, petrol/diesel etc. atangte, ran ek leh chirhdup hmun rimchhia atang a lo awm a ni.
- iii) **Nitrous oxide (N<sub>2</sub>O):** Nitrous oxide chu boruak chi khat, rawng nei lo, kang thei lo, thlum rim nam chêk a ni a, '*nuihna gas*' (laughing gas) tia hriat lar a ni. Nitrous Oxide hi ramngaw leh tuifinriatte hian a tichhuak ve reng. Mihring chuan nylon siamna te, nitric acid siamna te, leitha siamna te, motor leh thlai lam thil hal atangin kan tichhuak thin.
- iv) **FLUORINATED GASES:** Chlorofluorocarbons(CFCS), Hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride leh nitrogen trifluoride te hi a larzual te an ni a, hetiang gas hi kan hmanna langsar tak chu refrigerator(fridge) te, lawng leh thlawhtheihna a gas kan hman hi a ni awm e.
- v) **TUIHU (water vapour):** Global warming thlentu lian tak pakhat chu Tui Hu hi a ni awm e. Mihring khawsak sang zel ah, boruak ah thui hu a chhuak tam a, chumi leng vel chuan boruak a hnawng a siam a, boruak hnawng (humidity) sang chuan boruak a ti lum zual em em a ni.



A chung a kan sawi tak lo pawh hi sawibelh tur a la awm thei ang. Heti chin hi duhtawk phawt mai ila tha awm e.

**GLOBAL WARMING IN A NGHAWNG TE:** Khawvel lo lum zel hi amah mai chuan a ngaih mawhawm ngawt lo a, a nghawng chhe zel zawk hi a ngaih mawhawm ta chu a ni awm e. Tawi te te in lo thlur bing dawn ta ila:

- i) **SIK LEH SA INTHLAK NASA:** Global warming in a nghawng pui ber chu sik leh sa inthlak nasa hi a ni awm e. Khaw lum uchuak leh vawt uchuak (extreme climate) te hi a thleng nasa dawn a, a thleng mek bawk a ni. Sik leh sa mil zel a thlai tuh leh seng hun in awmzia a nei lo tial tial a. Khawkheng te, ruah tui tla tlem lutuk emaw ruah tui tam lutuk avanga harsatna te a tam deuh deuh dawn niin a lang. Hmun thenkhat ah tui a van em em lain thenkhat ah tuilian vang in harsatna a thleng bawk ang. A tawi zawng in ei leh bar zawn na kawng ah nghawng thui tak a nei ti ila kan sawisual awm love.



- ii) **TUIFINRIAT CHIM CHIN A SANG ZEL:** Boruak lum zel avang hian vur tlang te chu an tui ral hnem tial tial a, chu chuan tuifinriat chim chin a ti sang zel a ni. Hei hian khawvel pum a nghawng a, vur tawlh te, tuilian te siam in, ruah tui tlak dan thui tak a nghawng bawk a ni. Tin, boruak lo lum zel vang hian vur ram leh tui a cheng nungchate a nghawng nasa em em bawk a, nungcha thenkhat phe chu an mang phah dawn niin mithiam ten an sawi.



iii) **THLIPUI/CYCLONE A SIAM NASA:** Boruak lum zel hian tui-pui a tui te a tih lum belh nasa a, chu mi in a nghawng chu thlipui rapthlak cyclone/hurricane te hi an ni. Kum 2014 a USA a thlipui rapthlak tak, Hurricane Katrina te, 2015 a Hurricane sandy an tih te kha Global warming in a nghawng langsar a sawi te an ni.



iv) **MIHRING HRISLNA A NGHAWNG:** Mihring nunna leh a chhevel a thil thleng zawng zawng hi a inzawm vek ti ila a dik mai awm e. Global warming in a nghawng nasat tur zing ah pawh hian mihring hriselna ni sawi hmaih theih a nilo. Global warming vang hian natna theh darhtu leh natna a pung bawng ang tih a ni a, chung zingah chuan malaria, dengue fever leh kawthalo te hi an lang lian hle. Vun natna (skin disease) te a hluar zel ang a, mihring in a mamawh tawh tui a hmuh loh vang a natna pawh pung zel tur a rin a ni.



**GLOBAL WARMING TIHTLEM DAN LEH INVEN THEIHNA KAWNG THENKHAT TE:** A invenna lam hi a pawimawh ber a, mi tinin kan tih theih tawh theuhah tha kan thawh a tul a; hengte hi rilruah vawngin tihhlawhtlin tum ila a tha ang e.

1. **Electric Bulb pangngai chi aiah tube ang chi (cfl)-a thlak a tha:** CFLs hian bulb aiin energy zaa 60%-in a heh lo zawk. Hetia kan tih hian khaw tilumtu carbon dioxide hi kum khatah kg 150 vel a tlem phah thei.



2. **Air conditioner-a air filter tihfai fo tur:** Air filter tihfai hian carbon dioxide kg 170 vel a titem thei.



3. **Energy/Electric heh lo chi khawl lei thin tur:** Energy Star chhinchhiahna awm chauh lei tur a ni.



4. **Khawl thil reng reng standby-a dah loh tur:** TV hi off loin stadby mode-ah darkar 21 lai dah ta ila, darkar thum chung vel en bawk ta ila, electric tha a hman zawng zawng zaa 41 pakhat zet chu standby mode-a a awm chhunga a ei ral a ni.



5. **Tui lumna chi (water heater) te puan emaw lumna chhuak tur veng theia tuam chhawn a tha:** Hetia i tih mai hian carbon dioxide kg 500 lai chu kum khat chhungin i hum thei der mai.

6. **Hmun vawt laiah fridge hun tur:** Pindan chhungah pawh a lum laia fridge i hun chuan hmun vawta a awm aiin current a heh fe mai. Entirnan, pindan 30-35°C-a lumah fridge hung ta la, hmun vawta hun aiin a letin current a heh a ni. Carbon dioxide kg 160 zetin a pun pelh bawk.

7. **Fridge-a vur khawn tihfui fo tur:** A thar lei pawhin amaha vur khawn titui thei chi (Defrost) emaw frost free lei tur a ni. A let hnih laiin current a heh lo zawk.



8. **Thlasikah kawngka hawn huau loh tur:** Kawngka hawn rei lutuk hian in chung a lo vawt hman a, a tilum leh turin energy tam tak sen a ngai thin. Carbon dioxide ton 1 lain a pun phah thei.
9. **Chaw/chawhmeh chhum lain bel chhin flat tur:** Hetia kan tih hian a hmin hma a, energy tam tak a hum theih a ni. Pressure cooker hman theih hram duhthusam. Zaa 70 zetin mei a hek lo zawk.
10. **Insuk khawl(washing machine) hman dan tur:** Tlem te te suk nana insuk khawl hman chin hian current a heh hle. A khata suk daih khawl khawm a, vawi khata suk mai khan nasa takin electric bill a titem a, carbon dioxide a tichhuak tlem em em bawk.
11. **Tui vawt hman tam:** Tui tihlum nan hian mei leh current a hek hle. Loh theih loh a nih loh chuan tui vawt hman hram hram tur.
12. **Khawla thawmhaw suk sawr ro ai chuan nia pho hram hram a tha:** Thla ruk chung vel khawla sawr loin niah pho ziah la, carbon dioxide kg 350 vel i tichhuak tlem dawn tihna a ni.
13. **Hman nawn theih hman nawn tur (3Rs):** Ningnawi tlem zawnga hman nawn theih chi i hman nawn hram hram hian carbon dioxide kg 1200 zet kum khatah a chhuah tlem phah thei.

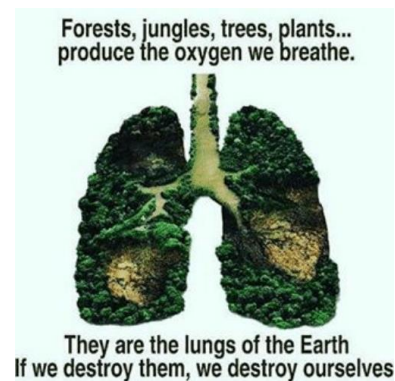




14. **Bawlhawlh neih tlem tur:** Ningnawingah hian bawlhhlawh a titam a, a tawihralna kawngah carbon dioxide tam tak a chhuak thin. Thil reng reng a hman nawn theih chung hman nawn hian nasa takin kawngro a su. Disposable tih ang chite hi hman tlem a tha. A siam chhuahna leh a thethangnaah hian boruak bawlhhlawh tam tak a siam chhuak.

15. **Thing phun uar:** Thing pakhat hian a dam chungin carbon dioxide ton| 1 hip ral theia ngaih a ni.

16. **Motor hmang tlem rawh:** Kea i kal theih hram hramnaah chuan kal hram la, kar khat chungin motora l kalna thin, kea i kal takna belkhawm chu mel 10 vel ni ta se, kum khat chungin carbon dioxide kg 300 zet zawtin i tihchhuah tlem phah dawn a ni.



17. **Motor infawm a tha:** Bus-a chuan te, a huhova motor inhmantawmte hi ram changkangah an uar thar. Mahnia motor lekchhuah theuh hian boruak a tibawlhhlawh nasa em em bik. Midang nen kar khatah motor-in ni hnih chauh pawh inchuan tawm ula kum khatah chuan carbon dioxide kg 760 vel zet in a tlem phah thei a ni.

18. **Motor chung a bungraw phurhna tangkai si lo vuah reng loh tur:** Hman tangkai dawn loh chuan pawisa hekna mai a ni. A rihna leh a thli dawna avang khan a tui zaa 10 zet in a hek phah thei.

19. **Motor enkawl uluk rawh:** A hun tak leh dan ang thlapa motor enkawl hian petrol/diesel a hek lo a, boruak bawlhhlawh a chhuak tlem bawk.
20. **Tluangtlam taka motor khalh tur:** Tlan chak thut, muan leh thut tih hian boruak bawlhhlawh a tichhuak hnem hle. Speed mar tha taka motor khalh tur a ni. A tui a hek loh bakah boruak bawlhhlawh a chhuak tlem bawk.
21. **Motor ke puar tha tak chauh hman tur:** Motor ke a thep chuan zaa 3 laiin motor a chak loh phah thei a, a tui a heh. A tui litre nga vel lo hum (save) thei ta ila, carbon dioxide chu kg 10 velin a tlem phah tihna a ni.
22. **Sikulah leh remchang dangah naupangte zirtir uar a tul:** An naupan laia an pawm ngheh tlat hi damchhunga an nun hrulaitu a ni thin.



23. **Ram tihkan leh thil hal mai mai chin loh tur.**

Ram kang avang leh thil hal mai mai avangin boruak bawlhhlawh a chhuak nasa em em. Mizoram bikah chuan hei hi kan buaipui ber tur niin a lang. Hal ngai lo chia lo neih dan a nghahhlelhawm hle.



Khawvel lo lum zel hian mi a nghawng a, kan tuar ve mek a ni tih hria ila. Ramdang mite tihchhuah mai a ni lo a, khawvela awm zawnzawngte hian kan thawh ve theuh a ni tih hria ila, a siam that hnaah pawh kan tel ve ngei ngei a ngai tih hriat a tha hle.

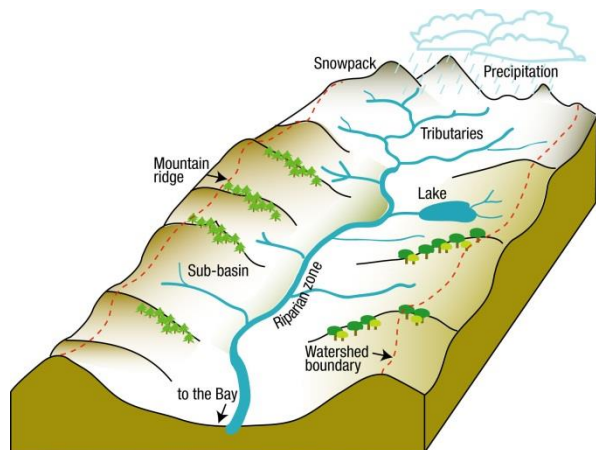
**Watershed: Thingtlang ei leh bar innghahna bulpui**  
**(Watershed: Ecological bank of rural economy)**



Mizo te hi hmasang aṭang a lonei leh ramngaw hausakna hmang a intung nung chho hnam kan ni a. Thingtlang mite chauh nilovin khawpui a cheng te tan pawh a kan ei leh bar hmuhna pawimawh ber pakhat chu wtaershed area hi a la ni reng a ni. Watershed hi kan ei leh bar hmuhna atana a pawimawh zia leh kan innghahna a nih zia hritachian kan tum dawn a ni:

**Eng nge watershed chu?**

Watershed awmzia chu kawr leh luite hrang hrang, lui lian zawk pakhat a inchung fin ten an huam chin ram/ zâu hi a ni, a ram zauh dan a zir in watershed hi then hrang hrang in a awm veleh bawk a ni (*Micro watershed, milli watershed, macro watershed etc.*). Tin, a awlsam zawng



a sawi chuan Watershed chu tlang dung pahnih inkar huamchung a ram te hi ti pawhin a sawi theih awm e. Phai zawl leh tlangram a watershed pianphung inang chiahlo mahse a pawimawhna chu a inang reng a ni.



## Watershed pawimawhna te chu engte nge ni?

Watershed aṭang hian kan nitin mamawh hrang hrang te direct leh indirect takin kan hmu ṭhin a, thingṭlang lam a chengte mamawh phuhruk na remchang tam tak a siam sak ṭhin a ni, chung te chu:

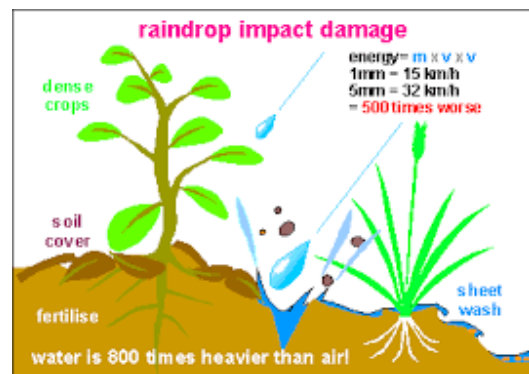


- 1) Ramngaw hausakna: Ramngaw hausakna kan han tih hian kan chenna insakna te, ei leh bar tur hrang hrang kan hmuh mai bakah ramhmul damdawi tam tak pawh kan hmuh theihna hmun a ni bawk a ni. Ramsa tinreng tan inhumhimna a siamsak bawk ṭhin. Thing leh mau te atang in thil chihrang hrang kan nei in kan siam thei a, heng kan thil siam te chu sum a chantir in eizawna kawng min siamsak a ni.
- 2) Lo neih/ huan siam: Mi hausa leh rethei pawh eitur mamawh lo kan awm awmlo e, heng eitur hrang hrang te hi leilung hausakna dang ang a laihchhuah emaw ve theih a nilo a, huan leh lo kan siam aṭang te chauh in kan nei thei a ni. Watershed area ah hian huan nghet leh ṭlangram lo te neiin kan ei leh bar tur thawh chhuah na hmun remchang tak a ni.
- 3) Tui intur min siamsak tu a ni: Fur ruahtui a rawn ṭla a, atam zawk te chu tuihawk in a luang ral leh mai ṭhin a, kan tui hna te lo siamthar a leichhung tui inkhawl te lo ṭipung tu pawimawh tak chu watershed area hi a ni. Watershed area a thing leh hnim hring awm te hian lei chhung thuk tak tak a zung kaihlin ruahtui lo ṭla te chu leichhung a put lut (percolate) thei turin an lo pui ṭhin a, hei hian tuihna siam thar leh kawngah nasa takin a pui a ni. In tur mai bakah kan thlai chawmna tur kan hmuhna atan hna ṭangkai tak an thawk bawk a ni.



4) Boruak thianghlim min siamsak: Khawpui tam tak te chu boruak thianghlim lo leh bawlhhlawh vangin an buai fo thin a, hmaikawr vuah lo a lenchhuah hrehawm khawp a boruak thianghlimlo nei khawpui te pawh an awm tawh. Watershed area a thiing leh mau awm te hian boruak tih thianghlim kawngah an pawimawh em em a ni.

5) Lei chunglang luangral tur vengtu: Ruah sur nasa leh tui hawk luang vang te hian kan lei chunglang hangtha te hi kumtin nasa takin kan chan thin a, ramngaw kan thin thin vang te pawh a ni thei awm e. Thing leh mau te hian ruah mal in lei na



taka a deng tur te chu an hnah hmang a lo dang in ruah mal tla te chuan nalo zawk in lei an thleng thla in hei hian ruah mal in lei chunglang nasa taka a ti kalral tur kha a veng thei a ni.

A chung a kan han tarlan bakah hian watershed hian kawng dang tamtakin mihringte tan hna pawimawh tak a thawkin kan dimdawi hi a apwimawh em em a ni.

## **WATERSHED LEH EIZAWNNA INKUNGKAIH DAN (Watershed: Interlinkage with livelihood)**

Watershed awmzia chu chapter hmasa lamah kan zirin a pawimawh na hrang hrang te pawh kan hrechiangkhat tawh in a rinawm a. Tun tumah chuan watershed leh kan eizawwna inkungkaih dan hrang hrang te kan zir ho leh dawn a ni:

- ii) **Tui hnianghnar kawngah:** Mihringte hi tui tellovin kan nung theilo ang bawkhian kan ran vulh leh kan thlai chintepawh tui mamawh ve tho an ni. Sawrkar hmalakna in Zoram khawtin deuhthawah PHE department in tui



intur min pe theuh tawh a, heng atan hian kan khaw ram leh khawthenawm ram hla tak tak atangin tui kan la thin a, heng kan tui lak thin hnar that leh that loh hi kan watershed enkawl danah nasa takin a inghat a ni. Kan watershed huam chung a ramngaw leh lui te dimdawi lo tak a kan enkawl chuan keimahni tui tlan ngei mai kan in hrek a lo ni dawn a ni.

- iii) **Nitin mamawh leh eizawwna kawngah:** Mizo te hi za a sawmsarih (70%) chuang kuthnathawk a eizawng kan ni a, watershed area hian kumtluanin kan mamawh kawng hrang hrang in min pe a, rawtuai/mautuai, hrui hngang leh insakna hmanraw thleng in kan mamawh kan dap khawmna pawimawh tak a ni. Hei mai bakah hian lui sa leh ramsa hrang hrangte tan chenna a pek mai bakah mihringte tan a kan eitur kan thawhchhuahna remchang tak min siam bawh. Tlangram lo atan a kumtin kan that chereu fo thin hian keimahni



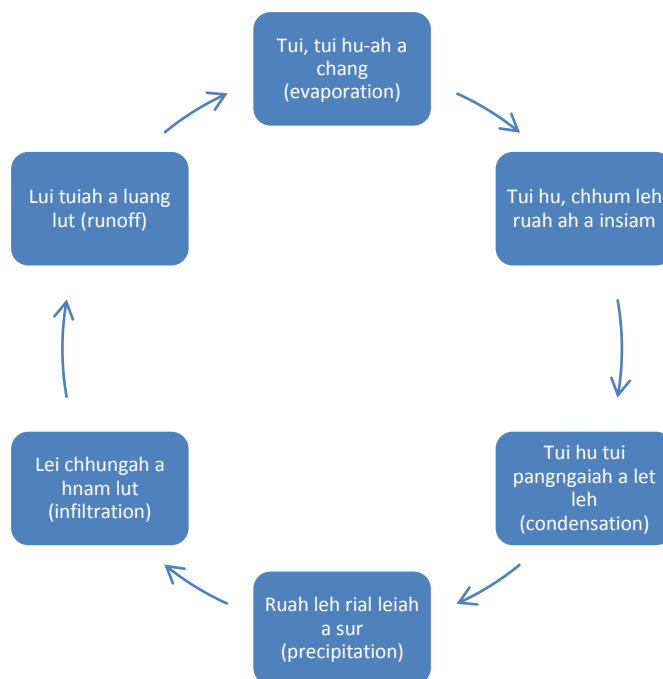
chungah ngei pawl kan khawih a ni tih kan hriat a pawimawh khawp mai.

**iv) Huan ngelnghehna kawngah:** Kan thlai chinte hian tui an mamawh tawh an hmuh loh chuan rah tha an chhuah theilo mai nilovin natna lakah an zuamawm (susceptible) em em bik a, hei vang hian an mamawh hun tak a khamkhawp tui an hmuh theih hi a pawimawh em em a ni. Tlangram leh hmunawih a huan siam thin kan nih avang hian tunlai thiamna hrang hrang; Tuifar hmang a tui pek (Drip irrigation), phingphisiau a tui pek (sprinkler irrigation) leh adt. hmang a tui kan pek a rem vek lohna a awm thei a, chuvang chuan kan huan sim te ngelnghehna (sustainability) hi watershed-ah hian nasatakin a inngat a, ramngaw in ruah sur a nghawng dan leh ruahtui luanral dan kawng ah a pawimawhna kan hre Chiang tawh a, hei vang hian huan ngelnghet leh thar hlawk thei nei tur chuan kan watershed kan enkawl dan hian kawng thui tak a hriat thei a ni.

A chung a kan han tarlan mai bakah pawh hian kan nitin nun, ei leh bar leh watershed inkungkaihna tam tak sawilan tur a awm awm e.

## LEILUNG LEH A CHHEHVEL A TUI CHETVEL DAN (WATER CYCLE )

Water cycle (Tui kal kual dan, Hydrological Cycle an ti bawk) hi lei chung lang, tui leh boruak inkar vela tui, a inkhawlkhawm dan leh a kal kual vel dan sawina a ni. Heng- boruak, tui pui, dil, lui, lei chunglang, vur ram te leh lei chhungrilah te hian khawvela tui awmte hi a inkhawlkhawm a, a inkhawlkhawmna hmun khat atangin hmundangah a insawn kual ve reng a ni. Heng- tui hua insiam (evaporation), tui hu atanga tua insiam (condensation), ruah sur (precipitation), tui luang ral (runoff), leia tui hnam lut (infiltration), vur tui hua chang (sublimation), thlai hnah atanga tui hu insiam (transpiration), vur tui ral (melting) leh lei chhungrila tui insemdarh (groundwater flow) hmangte hian hmun hrang hrangah a kal kual thin a ni.



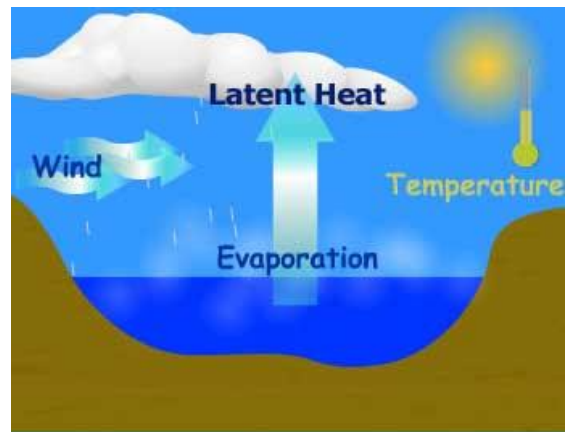
Tui, tui hua chang a, boruaka inkhawlkhawm zawng zawng zinga a tam zawk te hi tui pui (oceans) atanga insiam (evaporation) an ni a, chung zinga za zela 91 (91%) te chu tui pui ah bawk ruah hmangin an kir leh a, a dang za zela 9 te chu lei lamah khaw awmdan a zirin ruah hmang bawkin an kir leh a ni. A tlangpuiin lui a tui awm zawng zawngte hi ni 16 chhungin

vawikhat tal inthlak (renew) hman vek ang a ngaih a ni a, tin, boruak tui awmte pawh ni riat chhunga vawikhat tal inthlak (renew) hman anga ngaih a ni bawk. Tui inthlak kual nan hian hmun thenkhat heng- vur ram te, dil te leh lei chhungrila tui awmte hian hun an duh rei bik a, a thente chuan kum sang chuang lai te pawh a duh a ni.

Khing kan sawi zinga thenkhat, mihring tena kan hman tlanglawn em em lei chhungrila tui (ground water) te hian insiam thar lehna atana hun an duh aia rangin mihringte hian kan hmang ral zung zung a, hei hian an insiam thar leh theihna hlu tak chu kan ti khaihlak nasa em em a ni.

### **Tui kal kual dan hrang hrang te chu ilo thlir ho dawn teh ang.**

1. Tuihu a channa (Evaporation and Sublimation): Tui, tuihu a a channa dan hi *Evaporation* an ti. Hetia tui, tui hu a a chan theihna chhan chu Ni in tui a rawn chhun veleh a satna (latent heat/energy) kan tih khan tui chu hu (vapour) ah a chantir ta thin a ni. Boruaka tui hu awm za zela 80 te hi tuifinriat (ocean) atanga insiam te an ni a, a bak zaa 20 te chu lei chunglang leh thlai hnah atanga insiam (evapotranspiration) te an ni.

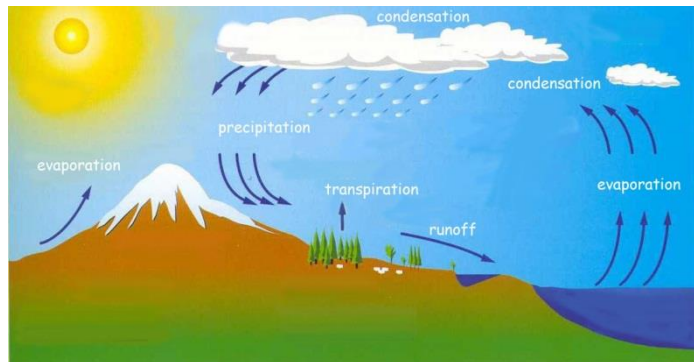


Tin, tlangpang leh hmun thenkhata vur tla emaw vur khawn awm te pawh hi boruak lum kan tih mai (dry air) in a rawn sut veleh khan, tui (liquid state) a insiam phawt lovin, boruakah tui hu-ah a chang nghal mai thin bawk a ni. Hemi tui hu a a insiamna dan hi Sublimation an ti.

Tichuan, chung boruak a tui hu inkhawlkhawm ta te chu thli (wind) in khawvel hmun hrang hrangah a semdarh kual veleh a, heng boruaka tui hu awm te hi boruak hnawn dan (humidity) hriltute an ni. Mi thenkhatte chuan

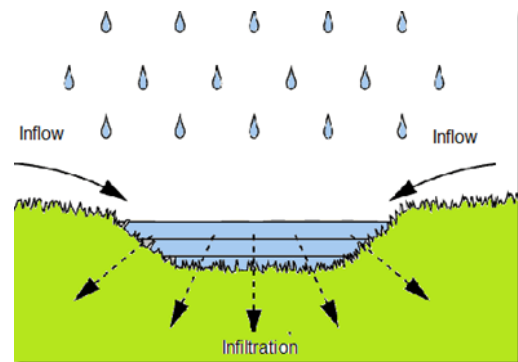
hun rei tak ata tawh he Evaporation hi hmang t̄angkaiin tuifinriata tui al te chu Chi (salt) lakchhuah nan an hmang thin a ni.

2. Tui, tuihu atanga insiamna (Condensation and Precipitation): Tui, tuihu a chang ta, tui pangngai bawka a rawn chan let lehna dan hi Condensation an ti. Tuihu te kha van boruak sang taka an thlen khan boruak lumlam (temperature) lo tlahniam in tui mal far te reuh



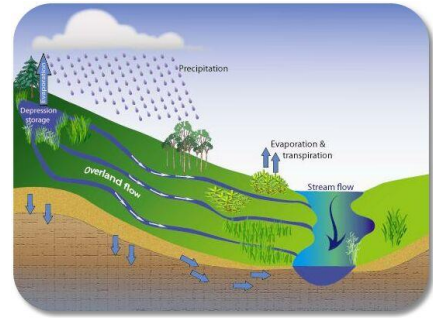
te te ah a lo insiam a, chung awmkhawm ho te chu lei nawi, boruaka leng vel te nen chuan inzawmkhawmin chhum leh tiau chhumte an lo siam ta thin a ni. Heng chhum te hi a then chu ruah tui pai chhumte an ni a; tuihu-a chang ta te tui ah bawka an lo let leh theihna atana hmanraw tangkai em em te an ni. Chhum ruah tui pai insiam atanga tuihu ruah tui a a lo insiamna dan hi *Precipitation* an ti.

3. Lei chhung a tui p̄ut lut leh p̄ut chhuak (Infiltration/ Percolation): Lei chhunga tui hnam lut hi *Infiltration* an ti. Ruah alo sur hian lei chhunga ruah tla khawm te chu lei karah an hnam lut a, chung hnam lutte chu inkhawlkhawmin thlai leh thingte tan nunna tui a pe a, tin, luite te, tuikhur te leh tuichhunchhuah te hnar ber a ni bawka.



Tui hnam lut (infiltration) kan tih hian lei chunglang paltlang a tui insem darhte a kawka ber. Lei in thuahtip dan a zir te, lei hraw leh hraw loh (texture) a zir te, thlai leh thing to azir te leh lei hnaiha tuihu a awm tam dan a zir te hian lei chhunga tui hnam luh dan hi a nghawng a ni. Thing buk tak tak to na hmunah chuan tui hnam lut tur a tlem deuh bik a, tin, tlak lei (clay) kan tih leh lung thil hmunah chuan tui hnam lut a muang thung.

4. Tuihawk luang ral (runoff): Tuihawk luang ral (runoff) kan tih mai hi ruah a sur chang a lei chunglang a ruah tui sur luang khawm, lui lian zawk emaw tuifinriat emaw lam pana a luanchhuahna hi a ni. Tuihawk luang ral (runoff) hi thil tam tak ah a innghat a, heng- leilung pianhmang (tlangram emaw phaizawl) te, leilung ziarang (lungmun, lei) leh thlai leh thing to te hian a nghawng a ni. Ruah sur hnem dan pawh hian tui luan ral dan chu a nghawng nasa hle bawh. Ruahpui vanawn te, ruah bawhawk kan tih te hian tui luang ral (runoff) tam tak a thlen thin.



Tui luang ral (runoff) hian a luanna lamah lei chunglang lei tha tam tak te chu a la hekin a luanral pui thin. Luite reuh te te atanga inzawm khawmin luipui lian zawk te finin a tawpah tuifinriat a thlen thin. Lei chunglang lei tha kalral tur ven nan hian luikawr tha mumal tak siam a pawimawh hle a ni.

5. Tuihu lengvel (Transport): Boruak a tui awm (tui hu) hi an vak kual in an insemdarh thin a, abik takin tuifinriat chung atangin khawmual lamah an insem kual thin. Heng boruak a vak vel a insemdarh te hi chhum lei vak tiin kan sawi thin. Heng chhum vei vak te hi hmuh tlang an har in thlawhtheihna te leh lirthei te chetsualna bulpui te zinga mi an ni.



Tui kal kual dan (Water Cycle) hian leilung leh a chhunga tui nihphung inthlak kual dan a entir ber a. Tui chevel a mumal loh leh inbuk tawh lo hian leilunga cheng te leh thlai te tan harsatna nasa tak a thlen thei a, kan tuihna te kan dimdawi a a in recharge leh theihna tur lotibuai leh tichhe thei zawng a hmasawna te hi hmasawna dik a ni em tih kan chhut uluk a ngai hle a ni.



## TUIHNA SIAMTHAR NA ATAN A THING LEH RAMNGAW PAWIMAWHNA (Role of forest in recharging ground water)



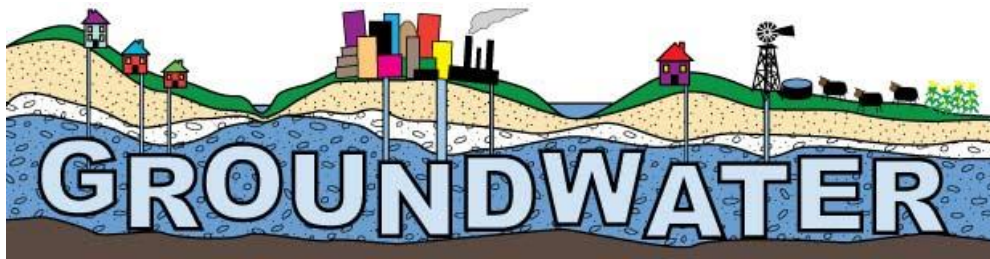
### RAMNGAW; LEILUNG MALSAWMNA

Siamtuin mihringte mamawh phuhru tur a min pek ramngaw, thing leh mau pawimawhna leh tui tuithianghlim intur kan neih theihna tur atan an pawimawhna kawng hrang hrangte tuntumah hian kan zir dawn a ni. Ahnuai tarlan te hi ramngaw tangkaina pawimawh tlangpui te chu a ni:

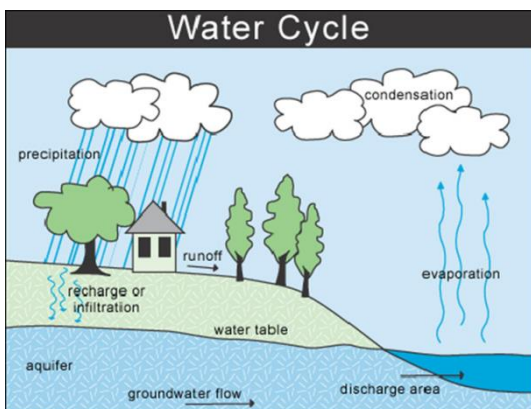
1. Ramngaw hian ruahtui a tlak tam tir.
2. Ramngaw te hi leilung vawng daitu tangkai tak te an ni.
3. Ramngaw hian boruak thawleng leh tui hu zam velte a vawng.
4. Ramngaw hian lei chhungrila tui inchhekkhawl theihna atan a fanpui.
5. Ramngaw te hian tuilian tur nasa takin a veng ve bawk.

Ramngaw te hian boruak lo ti dai in ruah te hi a lo ko ve thei khawp mai a, tin khawlum chho zel avang a kan harsatna tawh sutkianna atan pawh a kan hmatheh ber theih chu ramngaw te hi an ni kan ti thei awm e. Tui mamawhna a lo sang chho ve zel a, ramngaw hausakna kan mamawhna lah a ni telin a pung chho ve zel bawk si! Hengte avang hian '*Ramngaw – tui – sik leh sã*' inkungkaihna hi Chiang lehzuala kan hriatbelh deuh deuh a pawimawh hle a ni.

## TUI HNA (AQUIFERS) LEH A SIAM THAR LEH (GROUND WATER RECHARGING)



'Tuihna' kan han tih thin ber hi lei chhungril a lei leh lung khi kar vel a tui awm (aquifers) kan tih atang a tui rawn put chhuak hi a ni a, heng *aquifers* te hian lapua tui a chiah huh ang deuh hian tui a pai in chung a tui pai te chu boruak nekna (pressure) tlemna hmun deuh; tlang ruam leh lei khi kar atang te in rawn put chhuak in 'Tui hna' kan lo tih thin hi a lo awm ta a ni. Lapaw huh kan sawr a kan leih huh leh loa a lo ro mai thin ang deuh hian heng kan tuihna (aquifers) kan han toh te hi leih huh fo a nih loh chuan an lo ro chho tial tial ve thei a, Siamtu in a siamdan pangai ah chuan kum tin a ruahtui tla te hian rawmngaw a thing to te puihna hmangin zawi zawi in kan tuihna (aquifers) te hi a lo leih huh (percolation/ infiltration hmangin) ve leh thin a ni. Amaherawhchu, mihringte hmasawna leh duhamna hrang hrang avang te in khuarel pangai dan ang a kum tin fur tuiin kan tuihna a leih huh (ground water recharge) thin hi tihbuai leh tih khaihlak a ni nasa ta em em mai a,



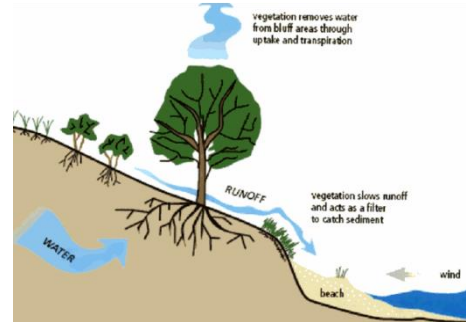
ramngaw kan thiat a, leilung thuahtip inremtha tibuaiin kawng nasa tak in kan lai rek ruak a, kan tui mamawh leh aopung chho tulh tulh mai bawk si. Hei vang hian leichhung a tuihna awm te kan siamthar leh theihna tur hmalakna hrang hrang te hi tihtakzet in kan tih a pawimawh em em a ni.

## THING LEH MAU (RAMNGAW)PAWIMAWHNA

Kan sawi tawh angin ramngaw hi khuarel leilung tana malsawmna hlu berte zinga mi a ni a, lei chhungril tui inchhekkhawmna tur atan leh hnianghnar zawka tlan tur a awm theih nan hna ropui tak an thawk a ni. Chung an hnathawhte zinga thenkhatte chu ilo thlir ho ila:

### 1. Lei a tui hnam lut tanpuitu

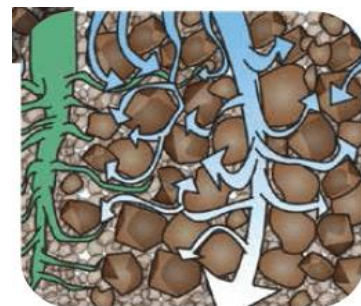
**(Infiltration promotion):** Eng hmun pawh thlai leh thing duang taka a tona hmun chu a lei dūr tha tak (soil texture and structure) hmun leh thlai chaw (nutrients) tamna hmun a ni tlangpui thin. Ruahtui/ tuihawk luang ral mai tur te chu thing bul a hnawl



leh thing hnah fla te chuan lo khuap tling in leichhung a putluhna hun (percolating time) rei zawk a lo siam sak a, chung tui tling te chuan thing zung lei chhung ril thuk tak thleng a in hreuh tawh sa te chu zui in leichhung a tui hna siamthar leh na kawngah nasa takin a pui thei a ni. *Lei nihphung (soil structure and texture) a vawng tha:* Lei chunglang thatna leh hausakna hi kan hman than dan a zir te, kan sawngbawl dan azirah te a innghat a. Ngaw dur khup ah chuan anmahni tawka rawng in bawl in, lei a lei tha awmte chintawh neiin an ei a, hei hian lei nihphung ti tha zual zelin awlsam takin leia ruahtui fla te pawh lei hnuai lamah an hnam luh theih phah a ni. Ramngaw awm lohna leh mihring tena kan tihbuai ramah chuan lei nihphungte an tha tawh lova, hei hian chak zawk leh thahnem zawka lei chhunga tui hnam lut tur a ti khaihlak a ni.

### 2. Lei chhungah kar awl (macropores)

**an siam:** Lei chhungril lam pana tui awlsam taka an luhthlak zungzung theih nana thil tangkai tak pakhat chu lei chhunga kar awl (macropore) te an ni. Heng kar awl te hi awlsam takin an insiam mai thei bik lova, anmahni tawka insiam tur chuan



**Lei kar awl ah tui an insemdarh**

hun rei tak a duh ṭhin. Amaherawhchu, ramngaw thing tona hmunah chuan thing te chuan thuk leh darh zau taka zung kaihin lei te chu su phel in heng lei karawl (pores) insiam kawngah nasa takin an pui thei a ni.

3. **Ramngaw in ruah fla a thunun (precipitation inhibition):** Thingkung te hian boruakah tui hu (transpiration) tam tak an thawn chhuak a, heng tui hu te hi ruah ah insiam leh in an rawn sur leh ṭhin. Ramngaw ṭhatna hmunah chuan boruak a dai in ruah pawh a fla tam nge nge ṭhin a ni.

Hnianshinar tak a tui kan hmuh theihna atan a ramngaw: Thing leh mau te an pawimawh zia kan hrechiang khat tawh in a rinawm a, kan chenna hmun leh a remchang hmundangah pawh chhungkaw hming te, nupa, ṭhian leh pawl hming te a thingphun uar a; enkawl zui pawh mawhphurhna la ngam turin kan rilru te siam thar zel ila a ṭha awm e.

***KUMIN A THING I PHUN ZAT NGE TAM I THING KIH ZAT LE.....???***

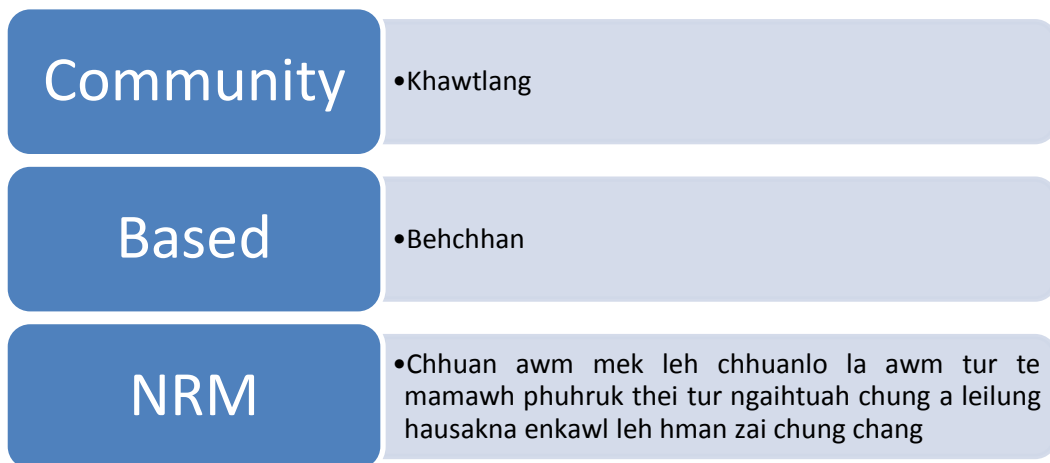


## CBNRM NIHPHUNG

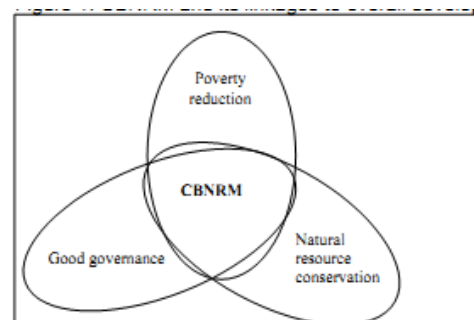
(Concept of Community Based Natural Resource Management)



Leilung hausakna nasatak a tih chereu a nih zel avang hian mithiam te chuan a siamthar leh na kawng hrang hrang te dap in hma nasa takin an la mek a. Heng hmalakna tamtak te chuan rah duhawm tak tak chhuah thin mahse beisei ang in a daihrei/ ngelnghet (Sustain) lo fo mai a. he harsatna ti kiang tur hian rawtna leh chindan thar chihrang hrang te enchhin a ni a, chung chindan zing a langsar tak pakhat chu tuna kan zir tur “**Community Based Natural Resource Management (CBNRM)**” kan tih hi a ni.



Tichuan Community Based Natural Resource Management kan tih chuan *khawtlang mipuite behchhan a leilung hausakna hrang hrang heng lei, tui, ramngaw, ramsa leh adangte daihzai zawk a hman dan inzirtir leh a chereu tur ven a siamthar leh kawng a hmalakna leh ruahmman te mipuite nen a siam hi kan ti thei awm e. CBNRM hian tihlawhtlin tum (objectives) chi thum (3) a nei an ti thin a,*



chung te chu – retheihna tih tlem, leilung hausakna vawn him leh khawtlang rorelna ðha siam te hi an ni. Heng thil pathum tihlawhtling tur hian kawngkhat chauh a hmalak hi a tawk mai lova, mipuite ðawiawmna leh inpekna hmang lo chuan tihlawhtlin theih a ni lo a ni.

### **CBNRM leh Decentralisation:**

CBNRM kalphung pawimawh tak chu thuneihna insemsawm (decentralisation) hi a ni. NRM hmalakna ðhenkhat chuan mipuite kut a mawhphurhna pe lovin project/ programme implement tu ten ðha an tih dan leh an ngaih pawimawh zawng te an hma mawp mawp mai ðhin a, hei hian a ram neitu leh hmalakna a tak a chhawrtu te a ti tui lovin ‘Neitu nihna rilru’ an neih loh phah ðhin a ni. Chuchuan project/ programme hmalakna enkawl zui leh ngaih pawimawh zuina a ti bovin sum tam tak seng a hmalak tawhna te chu engmahlovah a chhuah leh ðhin a ni. CBNRM ah chuan hmalakna chhawrtangkai thei tur mipuite kutah thuneihna a tam thei ang ber dah a, project/ programme a zawh hun pawh a enkawlzui leh a ngeinghehna kawng a mawhphurhna pawh dah a ni.

### **CBNRM leh Peoples participation**



NRM hmalakna hrang hrang te hi a chhawrtu mipuiten an tan a tih a nih leh nakin thleng a hlawkna tel tu an ni dawn a ni tih an hriat loh chuan hmalakna hi a ngeinghet tak tak thei ðhinlo. CBNRM ah chuan ruahmanna (planning) a tam thei ang ber mipuite kutah dah niin a thawh leh vilzui kawngah pawh mawhphurhna sang tak pek an ni bawka ni. Mipuite kut a mawhphurhna pek hian anmahni ah kalphung leh rorelna ðha (good governance) an neih theihna kawng a hmalakna pawimawh tak ani bawka ni.

## CBNRM leh community mobilisation

Mipuite kut a mawhphurhna pek an nih reng reng in an theihna tih hmasawn leh thultukna dik siam thei tur a zirtir hi tihmakmawh a ni. CBNRM chuan mipuite zirtir a chawhphur hi a kentel pawimawh tak zing a mi a ni a. Ruahmanna duan na leh chung ruahmanna tihlawhtling tur a ke pen tur a buatsaih nan training leh a taka enchhin



(demonstration) te hi CBNRM component pawimawh tak a ni. ipuiten inpekna thuk tak an neih theihna tur te, an ruahmanna tihlawhtling tur a inpumkhatna tha an neih theihna tur te, a huho a hmalak an thiam theihna tur a kaihhruai te leh tanpui an mawhmawhna a puitu tur dap thiamte zirtir hi CBNRM kalphung laipui a tel tlat a ni.

A chung a kan han tarlan tak ang khian CBNRM hian leilung hausakna venhim hle cheithat ngawr ngawr a bitum lova, leilung hausakna leh a chhawrtangkaitu mipui leh khawtlang te tan hmasawna ngelnghet leh chhawrnahawm zawk thlen hi a tum a ni. Chumi ti hlawhtling tur chuan CBNRM chauh chuan a thlen thei kher lovin sawrkar leh pawlho hmalakna hrang hrang nen a thawhho a pawimawh hle bawk a ni.

# NGELNGHET TAK A LEILUNG HAUSAKNA ENKAWL KAWNG A MIPUI TE LVE PAWIMAWHNA

(Importance of Community Participation for Sustainable Natural Resource  
Management)



Hun reitak atang tawh khan sawrkar, pawl ho leh mimal thahnemngai ten leilung hausakna ti hmasawn tur kawng a hmalakna hrang hrang an lo kalpui tawh a, hlawhtling tak tak sawi tur te awm tawh mahse hun rei tak daih erawh a ni ngai meuh lo a ni. Hnathawh tawh te ngelngheh leh daihrei loh fo na chhan hi han kawh bik tur tak awmlo mahse a chhartu mipui te tel lo a ruahmanna leh hnathawh te kenkawh a nih thin vang kan ti thei awm e. hei vang hian hmalakna kawng hrang hrangah mipuite an telve a pawimawh em em a ni.

**a) Neitu nihna (Sense of ownership):** Hmalkan tur rel leh ruahmanna duan chung changah a chhar tangkai tu tur mipui te ngei tluk a anmahni mamawh hrechiang an awm awmlo e. Mipuite an mawmawh te zawh an nih a chu an mamawh ti hlawhtling tur a ruahmanna siam kawng a kan telh anih chuan kan



hmalakna tawp thlengin phur takin an thawh theih mai bakah neitunihna rilru pu chungin thil (assets) siam te an enkawl thei dawn a, chu chuan kan hmalakn ngelnghehna nasa takin a hril thei dawn a ni.



- b) **Hmalakna a chak ðhin:** Khaw mipui ten an mahni duh leh mamawh ngei mai dunag chhuak a hmalak pui an nih chuan hnathawh na kawng hrang hrangah harsatna a tlein hmasawna a chak phah em em ðhin a ni.
- c) **Hnathawh vil zui leh enzui kawngah:** Hmalakna a mipuite kan telh tam a ruahmanna an mahni rawn chung ngei a siam anih chuan chung hmalakna nihphung hrechiang takin hnathawh awm ho reng reng te chu a ðha tawh em tih uluk takin an vil thei ðhin a, heihian hna thawhte a ti daihrei in a ti hlu zual ðhin a ni.
- d) **Senso a tlem phah thei:** Mipuite mamawh leh duhzawng tak mil a an mahni rawn chung a ruahmanna siam anih chuan mipuite an lo phurin mahni inhuamna pawh an lo nei sang ðhin a, heihian hnathawna atan senso a ti tlein ruahman bak hna te pawh a thawh theih hial fo ðhin a ni.



Mipuite ruahmann siam a an telve hlawkna leh ðhatna tamtak kan sawi rual hian ruahmman ðha tak kan duanchhuah theihna tur chuan kaihhruiana felfai leh chiang an mamawh fo ðhin a, hemi atan hian a buaipuitu (facilitators) te pawh inpuahchah uluk a ngai hle a ni.

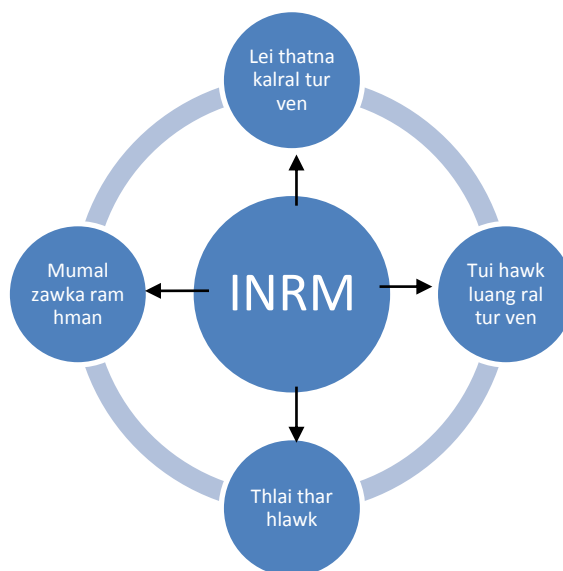
## Integrated Natural Resource Management (INRM)

### THUHMAHRUAI

Leilung hausakna te hi renchem lo leh uchwak taka kan hman chuan tun hun leh nakina kan tu leh fate tan hun khirh tak kan siamsak dawn a lo ni reng mai. Kan khawvel hmasawna chak tak leh changkanna ke pen chak tak hi um pha turin kan kan kuta hausakna (resources) awm ang ang te kan hmang bawrh bawrh mai a; amaherawhchu, fing leh uluk taka ngaihtuah chian a, renchem zawka hman, enkawl leh humhalh hi kan tih tur pawimawh tak a ni.

### INRM

INRM hi mi nawlpui hriatthiam dan chuan dimdawih leh renchem zawka kan leilung hausakna heng- lei, tui, ramngaw leh nungchate, kan loneihna leh thlai tharte a lo hlawk zual deuh deuh theih nana kan chhawrthiam theih na tura hmalakna a tih theih ang. INRM hian mihringte leh khuarel inlaichinna leh an inkungkaihna lam thil a buaipui a, chungte chumal zawka ram hmandan tur ruahman te, tui renchem leh hlawk zawka hman te, ramngaw leh nungcha humhalh te leh kan hmu huna heng- loneih (agriculture), lungalhthei leh tuialhthei (mining), zin veivak te atanga hlawkna (tourism), sangha dil (fisheries) leh ramngaw (forestry) hlawk zawka kan chhawr tangkai zual deuh deuh theihna tura hmalak te a ni.



## INRM HMALAKNA THENKHATTE-

Heng ahnuai tihdan phung leh ruahmanna tarlante hi Integrated Natural Resources Management (INRM) hnuai hmalakna hmun thenkhata hlawk taka an lo kalpui tawh te an ni.

1. **Leilung pianhmang tihdanglam (Structural Measures):** Hemi hmanrua hian lei leh lung pianhmang chi hrang hrang neite siam leh sak a kawhmmuh a. Lei chunglanga tui luangral tur chu veng in alwsam taka tui (water) leh lei chung hang (soil fertility) kal ral mai tur a veng a ni.

2. **Thlai leh thing buaipui (vegetative measures):** Hei hian kan thlai chinna leh kan ram neihte mumal leh awmze nei zawka kan hman theihna tur tihdan hrang hrang a kawhmmuh. Chutih rualin, kan thlai tharte thlai hrisel zawk leh hlawk zawk an nih theihna tur kawng a kawhmmuh bawk.

### A. **Tlangrama tihdan tur (Upland treatment):**

Kan sawi tawh angin eng vak maha kan ngaih loh fur laia tui hawk luang te hian lei thatna (soil fertility and nutrients) tam tak an luanbo pui thin a, kar lovah lein a hriselna a hloh thin. Hei hi loneituten kan hriatchian a pawimawhin a venna kawnga kan beng kan tihvar zual a pawimawh a, tihdan tur tha ruahmante kan zawm hram hram a tha hle a ni.

Heng tihdan tur ruahmante hi- lei chung hang tha kalral tur vennan te, ram ruakte tangkai zawka hman an nih theih nan te, loneitu ten lei thatna an venhim paha an hlauh a lo pun zel theih nan te, tin, lui chhunga tui hnam lut a lo pun zual zual zel a (enhance percolaton) thlai mamawh tui a hnianghnar zual zel theihna atante a ni. Chung tihdan tur ruahmante chu i lo zir ho dawn ang u.

### 2. **Lei laih khuar (Staggered Trench):**

Hei ruahmanna hi tlang panga lei laih khuar a ni. Tlang pang thenkhat loneihna atana hman, awih lutuk lo, terrace awm lohna hmunah an siam thin. He leih laih khuarah hian tui an





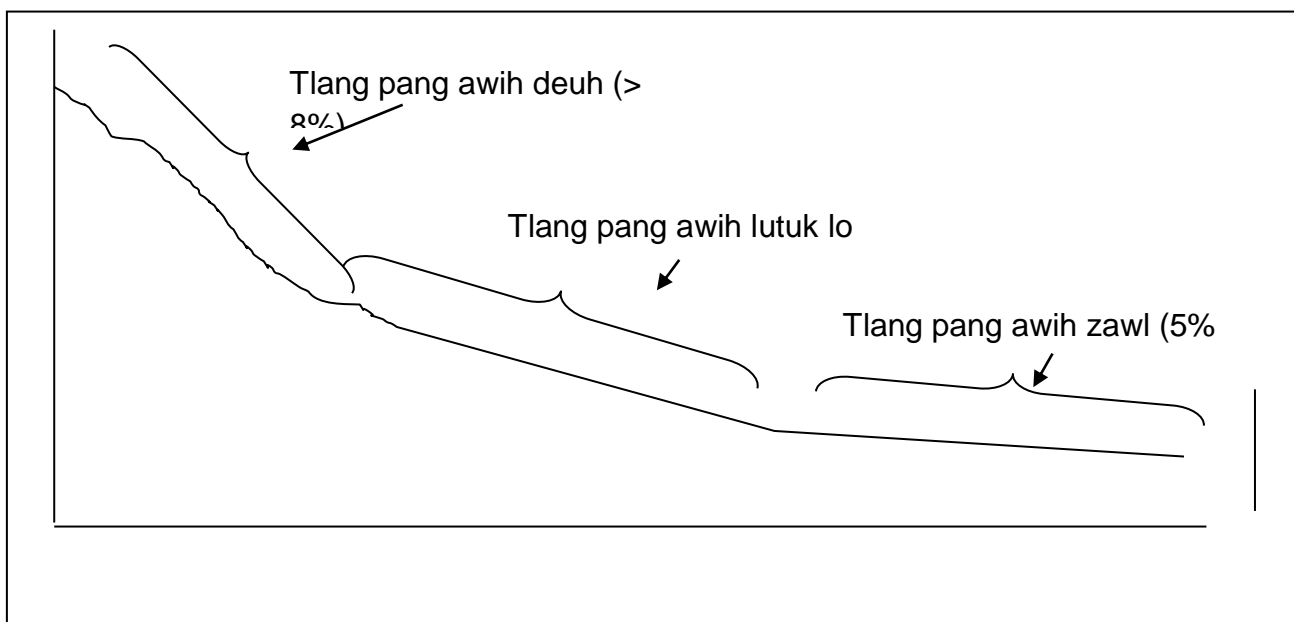
**B. Thlai chin leh chindan kalhmang (Vegetative measures):**

Loneitu tam takte ngaihdanah chuan thlai kan thar hlawk theih deuhte emaw, kan duh duh thlai, kan duhdan kalhmang zawmin kan pawngpaw chin mawp mawp mai zel a, hei hi kan leilung hausakna kan hlohna kawng pakhat a ni.

Kan leilung hausaknate kan venhimna atan chuan leilung pianhmang azirin kan thlai chinte leh kan chindan te kan tih danglam ve hi a ni. Thawklehkhata hlawkpui viau tur angin langlo mahse zawi zawiin kan hma hun kan tu leh fate tana rahbi duhawm kan chhersak reng tihna a ni. Heng ahnuacia tarlante hi chik zawkin i lo zirchiang ang u.

**1. Tlang pang awih deuh ah (Slope greater than 8%):**

- Lei pang awih deuh hlekah chuan thlai emaw ramngaw kumhlun tur chi kan chingphun tur a ni.
- Thing eng chi pawh 6 ft. inkar hlata phun in, lei laih khuar (staggered trench) kha tih leh bawk tur.
- Thing in a khuh loh hmunte chu hnim emaw thlai dang to tir leh tur.
- Leih laih khuar (staggered trench) vangin thing leh thlai phunte chu a hranpaa tui pek an ngai tawh lovang.



## 2. Tlang pang awih lutuk lo (Slope less than 8%):

- Hetiang hmunah chuan thingzai tur chi emaw sum chang thing (Horticultural plantations) lam chi te emaw phun a tha.
- Lei laih khwar (Staggered trench) siam leh a tha.
- Ram awl laiah thlai dang chin a tha bawk. Hei hian sum lakluh a tipung ve thei bawk.

## 3. 5% Model, Tlema zawl awih deuh hlek (Medium upland):

- Ram bial khatte chu bial hrang hrang ah an then hrang leh thliah.
- Chung then hran leh thliah te zau zawng atanga za zela panga (5%) bial chu tui khur atan laih tur. A thuk zawng 3 ft. atanga 7ft. zelin.
- Entirnan, ram a dung 50 ft. leh a vang 30 ft. ah chuan tui khur siamna atan 10 ft. a dung leh 6 ft. a vang ruahman tur tihna a nih chu.
- He tihdan hmanga hi December leh June inkara buatsaih a tha ber.
- He tihdan hian loneitute chu tui fur laia tui khawlkhawm tirin, thal tui vanlaia tui hman tur a pe.
- Lei chhungah tui tam zawk an hnam lut thei a, hei hian thlai tan tui hnianghnar taka hip luh tur a pe.
- He ruahmanna hi ruah tui tlak tam lutuk lohna leh thlai tena tui hniang hnar an dawn lohna hmunah a hmantlak hle.



**5% Model leh Buh hmun (lowland**